# Evaluating a Regional Approach to Technical Rescue in Urbandale, Iowa

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## CERTIFICATION STATEMENT

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

Signed: Lance W. Rowton

## Abstract

The problem was the Urbandale Fire Department does not have technician-level technical rescue capabilities. The purpose of the research was to assess the feasibility of establishing a regional technical rescue team to serve Urbandale, Iowa, and surrounding communities. The action research method was used in this project. Three research questions were used: (a) What is the current technical rescue capability of the Urbandale Fire Department? (b) What training and equipment is necessary to establish a technical rescue team? and (c) What formats are other regions using to address a regionalized approach to technical rescue? The procedures used in this research included personal conversations with the Urbandale Fire Department's main mutual aid technical rescue partner, review of industry articles and publications regarding the establishment of technical rescue teams, a review of the positive and negative aspects of potential regionalization, consolidation, and collaboration, and an extensive internet-based search. Results from this research included the authoring of a draft meeting plan that could be used to hold an initial collaborative meeting regarding the possibility of regionalized technical rescue services, as well as a compilation of a sample equipment list and sample standard operating guideline. Recommendations from this research were a) the Urbandale Fire Department is not warranted to establish its own technical rescue team but should instead engage in meetings to explore a regionalized or collaborative solution, b) the Urbandale Fire Department should consider the adoption of standard operating guidelines used by its main technical rescue mutual aid partners to best streamline operations and c) the Urbandale Fire Department must have a plan for ongoing training prior to engaging in technical rescue service delivery.

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Technical rescue incidents create a unique hazard to the fire service. These responses are low in frequency and high in risk. Providing technical rescue services is expensive and requires specialized equipment and training (Marinucci, 2011). The Urbandale Fire Department (UFD) does not currently have a technician-level technical rescue response capability. As such, the department has to rely on mutual aid resources to handle a call of this nature. The City of Urbandale has grown significantly over the past two decades. Between 1990 and 2013, the population increased from 23,500 to 41,776. As of July 1, 2016, the population was estimated to be 43,018 (United States Census Bureau (USCB), 2017). In 1990, the Urbandale Fire Department responded to 1,731 calls for service. In 2016, the Urbandale Fire Department responded to 3,319 calls for service (UFD, 2017).

The likelihood of a technical rescue incident occurring in the City of Urbandale is a significant concern. The Urbandale Fire Department does not have the training, resources, or equipment to handle a technician-level response within the city. If the Urbandale Fire Department were to gain the ability to provide technician-level technical rescue response, it would enhance response capability and the services provided to the residents of the community. Some communities surrounding Urbandale do have partial technical rescue capability. By gaining technician-level technical rescue capability, the Urbandale Fire Department could better contribute to the technical rescue capabilities of the region as a whole.

The problem is the Urbandale Fire Department does not have technician-level technical rescue capabilities. A standard operating guideline (SOG) regarding technical rescue response does currently exist, but it is based strictly on the utilization of mutual aid resources to handle technical rescue incidents. There is currently no technical rescue plan or training program in

place to address further expansion of technical rescue capabilities. This applied research project aims to address this situation to better prepare the Urbandale Fire Department for technician-level response to technical rescue incidents.

The purpose was to identify procedures used in other suburban fire departments to determine the most effective ways to provide technical rescue services through regionalization of operations. To best address this problem, three research questions were used to guide the project. These research questions were (a) What is the current technical rescue capability of the Urbandale Fire Department? (b) What training and equipment is necessary to establish a technical rescue team? (c) What formats are other regions using to address a regionalized approach to technical rescue?

The method applied to this research was the action research method. This method was chosen because it allows for the development and proposal for a regionalized solution to technical rescue demands in the Urbandale, Iowa, region. This proposal would allow for a more cost-effective and efficient response to these low frequency, high-risk events.

## Background and Significance

The Urbandale Fire Department is located in Urbandale, Iowa. The department primarily operates in a suburban environment and serves a resident population of approximately 43,000 people. Urbandale is a suburb of Iowa's capital city, Des Moines. The department currently employs 43 people. This includes a full-time Fire Chief, two full-time Assistant Chiefs, a full-time Fire Marshal, and a part-time Assistant Chief. There are six full-time Lieutenants, six full-time Driver/Engineers, and 19 full-time Firefighter/Paramedics and Firefighter/Emergency Medical Technicians. The remainder of personnel includes part-time Firefighter/Paramedics,

part-time Firefighter/Emergency Medical Technicians, a full-time billing specialist, a part-time inspector, and a part-time billing specialist.

The Urbandale Fire Department currently has a standard operating guideline (SOG) for response to technical rescue. However, the SOG does not provide operational procedures; rather, it directs personnel to request mutual aid resources from other agencies to address the issue at hand. While this solution has been sufficient in the past, the demands for service and call volume have increased. This population growth has not only occurred in Urbandale but in surrounding cities as well. Urbandale shares a geographic border with the cities of Johnston, Grimes, Clive, Waukee, Des Moines, and Windsor Heights. In addition, Urbandale works closely with another Des Moines suburb, West Des Moines.

Table 1

*Recent Growth in Cities Near Urbandale, Iowa*

| City | Population Estimate as of July 1, 2010 | Population Estimate as of July 1, 2016 | Estimated Growth Percentage |
|---|---|---|---|
| Urbandale, Iowa | 39,459 | 43,018 | 9.0% |
| Grimes, Iowa | 8,255 | 11,909 | 44.3% |
| Waukee, Iowa | 13,778 | 19,284 | 40.0% |
| West Des Moines, Iowa | 56, 703 | 64,560 | 13.9% |
| Johnston, Iowa | 17,266 | 21,114 | 22.3% |
| Clive, Iowa | 15,412 | 17,546 | 13.8% |
| Total | 150,873 | 177,431 | 17.6% |

*Note.* Data for growth in cities near Urbandale, Iowa, retrieved from United States Census Bureau (2017).

As these areas continue to grow, the likelihood of a technical rescue incident also increases. As this threat becomes more likely, action must be taken to better prepare. Should each individual city staff, train, and equip its own technical rescue team? Or is a regionalized approach the better option? Should each city take a specific discipline within the technical rescue realm, or should one team be formed and utilized to cover all participating entities?

The background of the problem includes several responses by the Urbandale Fire Department to technical rescue responses in the past. In each case, the Urbandale Fire Department was either not properly equipped or not sufficiently trained in the skills needed to operate at the technician-level to handle the situation at hand. On June 6, 2001, the Urbandale Fire Department was dispatched for an adult male that had been trapped in a trench collapse. Initially thought to be a recovery operation, the victim was found after approximately three hours of scene operations. He was conscious. This incident required the assistance of nine different agencies and over 60 responders. The Urbandale Fire Department did not have trench rescue capabilities or equipment. After a total of five and a half hours, the victim was successfully removed from the trench (Holt, 2002).

On December 9, 2013, the Urbandale Fire Department was dispatched in a mutual aid capacity to assist in a high-angle rescue. An adult male had become stranded on a bridge that was under construction and was unable to get down. Upon dispatch to the scene, the emergency communication center was notified that the Urbandale Fire Department was not trained in technician-level high angle rescue techniques and only manpower could be provided. The Urbandale Fire Department could not perform the rescue. Eventually, the jurisdiction requesting aid was able to produce an adequately trained rescue team and the UFD response was cancelled

(UFD, 2017). As of this writing, the Urbandale Fire Department still does not have a trained or equipped trench rescue team nor does it have an adequately trained rope rescue team.

The present environment in the Urbandale region is currently primed for collaboration and regionalization of public safety efforts. Two cities that border Urbandale have recently undergone an operational consolidation. These two entities, the cities of Johnston and Grimes, have combined their efforts and now make up the newly formed Johnston-Grimes Metropolitan Fire Department. This joint effort was one of the first of its kind in the region. By combining resources from both jurisdictions, operational capabilities were enhanced and service delivery was improved. As part of the consolidation, administrative resources, staff, and equipment were shared. A jointly agreed upon financing formula was established and each participating city contributes funding based on call volume, assessed property value, United States Census Bureau data, and square miles of incorporated area. (Johnston-Grimes Metropolitan Fire Department (JGMFD), 2016).

The future impact of a regionalized technical response could be significant for the Urbandale region. A dedicated technical rescue team or regionalized technical rescue approach would allow each partner to have a consistent plan to handle technical rescue situations. Members of the team could receive more consistent, higher-quality training, and overall department morale could be improved. As each city continues to grow, the capability to handle this type of call for service must be addressed.

This study is significant to the Urbandale Fire Department and the greater Urbandale region for three reasons. First, the growth of the region as a whole is projected to continue into the future. As such, the likelihood of a technical rescue event occurring continues to rise. Currently, the Urbandale Fire Department SOG for technical rescue requires the use of mutual

aid resources (UFD, 2001). As each city grows, their resources will continue to be more taxed. Staffing shortages and other factors may not allow for those specialized resources to be immediately available.

Second, the study will identify training and equipment necessary to establish a technical rescue solution for the City of Urbandale and the surrounding region. It will also allow the costs of establishing a technical rescue team to be identified. Different staffing models will be researched that can provide realistic staffing solutions to this problem.

Third, the regionalization could allow for a reduction in capital and an associated decrease in operational costs. The Urbandale Fire Department currently operates a heavy rescue vehicle that carries a variety of equipment, including shoring material. The Johnston-Grimes Metropolitan Fire Department operates a similar piece of apparatus that also carries shoring equipment. Eliminating one of the two resources and providing technician-level training to staff members would allow one truck to be used to provide shoring capability to the entire region.

The third goal of the Unites States Fire Administration (USFA) is to "enhance the fire and emergency services capability for response to and recovery from all hazards" (USFA, n.d., p. 12). This study relates to USFA Strategic Goal #3 as it better prepares the Urbandale Fire Department to respond to a technical rescue incident. It allows for the region, as a whole, to be better trained and equipped to address unique technical rescue hazards. This study could lead to advancements that improve efficiency and reduction in capital while utilizing an all hazards approach to regionalization and collaboration of response efforts. Establishing a regional technical rescue response plan for the Urbandale Fire Department and the surrounding region allows for all stakeholders to enhance their preparedness and response capability as outlined in USFA Strategic Goal #3.

The primary goal of the Executive Analysis of Fire Service Operations in Emergency Management course is "…to provide the students with the knowledge and skills they need to effectively analyze fire service operations in emergency management to better prepare their communities for large-scale, multiagency, all-hazard management" (USFA, 2016, p. vii). The use of the action research method in this project, combined with information obtained regarding regionalization of technical rescue, will allow the Urbandale, Iowa, region to be better prepared to handle an incident of this magnitude. A technical rescue event in the Urbandale, Iowa, region is likely to be a multiagency event. The consideration of a collaborative approach to improve response capability directly relates this research project to the primary goal of the Executive Analysis of Fire Service Operations in Emergency Management course.

## Literature Review

The National Fire Protection Association (NFPA, 2017) divides technical rescue professional qualifications into three distinct operational realms. The three divisions are awareness level, operations level, and technician level. Awareness level is representative of the minimum level of capability and competency that an organization must provide in order to appropriately respond to technical rescue incidents. Operations level responses suggest an increased level of capability and competency and allow for the identification of hazards, proper use of specialized equipment, and execution of specific rescue maneuvers. A technician level responses allows for the highest level of operational capability and competency and includes advanced rescue techniques with specialized equipment. NFPA (2017) states that a minimum of awareness level training should be provided to all organizations.

The design of a technical rescue program should contain a plan, desired level of competency, and plan for continued competency and program evaluation. A mission statement,

core values, goals, objectives, and standard operating guidelines should be included. Second, the desired level of competency (awareness, operations, technician) must be identified and training programs should prepare responders to operate at that level. Third, outside experts should perform a program evaluation and should assess record keeping, practical skills, knowledge, and response to real world scenarios.

In many cases, the need for specialized technical rescue teams has been identified as a result of a change in community risk factors or in response to specific incidents that have occurred within a response area (Naum, 1994). Acceptable risk must be determined by the locality and the emergency response system capabilities should be aligned with the risk profile. Several factors should be considered when developing a risk profile. Environmental factors to consider include threats from natural disasters such as: hurricanes, tornadoes, earthquakes, winter storms, bodies of water, and flood-prone areas. Some physical factors to consider include: structural stability, occupancy types, degree of industrialization, construction types, and changes to occupancy usage. Other miscellaneous factors to consider are the frequency of fire, transportation accidents, terrorism, and hazardous materials incidents (Naum, 1994).

Fire departments should proactively inform local elected officials and decision makers on the technical rescue hazards faced within a community. This may provide further justification for the development of a technical rescue team. These risks, along with the current capabilities of currently established rescue agencies should be communicated. Federal, state, and local requirements, as well as industry and national standards impacting technical rescue should also be cited as justification for the establishment of a technical rescue team (Reimer, 1996).

There are several different technical disciplines within the realm of specialized rescue. They include, but are not limited to: high and low angle rope rescue, motor vehicle extrication

operations, industrial extrication and entrapment rescue, confined-space operations, trench and excavation rescue, below-grade rescue, structural collapse rescue, ice rescue, swift water rescue, and hazardous materials response (Naum, 1994).

Utilizing regional response teams can improve the quality of services offered to the public. Redundant operations and inefficient capital purchases can be reduced. Crowley (as cited in Singletary, 2003) provided several reasons for establishing regional response teams. Among these reasons are: more cost-effective response, elimination or reduction of overlapping and duplicating services, cost reduction through volume purchasing, and depth of personnel and equipment.

According to Naum (1995), the planning process for the implementation of a technical rescue team can be broken down into ten tenants. The tenants are: What type of specialized rescue team(s) is required? What risk factors are present (or are potentially going to be present) within the jurisdiction? What level of expertise currently exists within the organization? How can the system enhancements be best achieved? To what level or degree of technical capabilities will the plan achieve? How can the service be best achieved? What is the current or projected level of interest of staff and personnel? What are the projected financial considerations and impacts? What influencing regulations/standards must be complied with? What is the time commitment for organization, development, and implementation of the program initiative?

Feder (2012) used a six-step process to establish a technical rescue team. First, he suggests an assessment of the department, membership, and response district to determine if a team is actually needed. Second, evaluation of potential funding sources and financial support should be made. Third, an assessment of equipment must be made and a determination made on what equipment is essential and what equipment is not essential. Fourth, a training plan and

associated guidelines must be put in place. Fifth, locations to place the required equipment on department apparatus must be made to ensure that it can be accommodated. Finally, the department must commit to continued training and development and should not stop now that the previous five steps have been met. Monthly training, scenarios, and development should be established.

When considering the implementation of a technical rescue team, consideration must also be given to the organizational structure that will be utilized. Local conditions and factors, as well as the current state of inter-departmental cooperation, political factors, and legal issues will also impact the type of structure that will be used (Naum, 1995).

As part of the planning process, a clear training plan should be in place prior to the formation of the technical rescue team. It is important for the training program to be appropriate for the environment within which it will be used. Specifically, the program must be realistic, achievable, measurable, and documented (Naum, 1995). It is often difficult to accommodate the training requirement associated with technical rescue teams. As a technical rescue team member, skill proficiency requires nearly constant training and continuous research (Brown, 1994). When compared to traditional fire department activities such as inspections, routine training, and apparatus maintenance, there is often little time left to focus on the rigors of technical rescue preparedness (Brown, 1994). When considering training, management personnel should also be careful not to over commit technical rescue personnel to other duties. If too much is added to the responsibilities of a technical rescue team, the time required to complete all obligations and maintain technical rescue skill proficiency through training could be excessive (Sargent, 1991).

Support functions must also be considered. Support personnel should be trained to an awareness level in order to best serve the unified technical rescue effort (Naum, 1995). Training support personnel to this level allows them to gain an adequate understanding of the procedures, precautionary measures, and safety hazards associated with technical rescue (Naum, 1995). In addition to local resources, mutual aid resources should also be integrated into awareness level training in order to facilitate their involvement in a coordinated response (Naum, 1995). The development of an operational skill set among all members of a department will help significantly with staffing and training difficulties. If a limited number of technician-level personnel will be available in a technical rescue team, there will need to be a significant number of personnel trained to the operations level to act as supporting members (Reimer, 1996). Further, since technical rescue teams often arrive later in an incident it is essential for initial responders to have some level of technical rescue training (Sargent, 1991). When considering the training of support personnel, Rogers (1998) stated, "Train everybody-because everybody will be there" (p. 36).

The Virginia Beach, Virginia, Fire Department used a three-tier approach to train their personnel. Three levels of training were established. They were: survival training, support training, and technical rescue team training (Sargent, 1991). In the survival training segment, each member of the department was introduced to technical rescue operations. Support training was provided to all members of truck companies as these personnel are frequently assigned intermediate support operations during technical rescue incidents. Finally, certain personnel complete technical rescue team training. These personnel are spread out over several shifts so there is always a contingency available. These personnel gain several formal certifications at the completion of their training (Sargent, 1991).

As planning continues, a unified operational approach should be established. Stakeholders should work together to develop a coordinated and consistent approach that will work for everyone. Unifying operating procedures, incident management policies, and safety procedures, and standard operating guidelines should all be prepared before a technical rescue team is trained and deployed (Naum, 1995).

When considering a regionalized or collaborative approach to technical rescue, all stakeholders should be involved in team formation and planning. One of the best ways to do this is through development of a planning committee (Reimer, 1996). A planning committee should establish a committee chair and consideration should be given to the formation of subcommittees that can each be assigned a different technical rescue discipline (Reimer, 1996). For each technical rescue discipline, the assigned subcommittee should produce a staffing plan, identify equipment needs, identify training requirements, and develop a budget proposal (Reimer, 1996).

Staffing solutions for the technical rescue team must also be addressed. Fire departments should make an assessment of the expertise offered by their members as well as the level of interest in joining a technical rescue team among members. Many departments attempt to train all members of a fire department to the highest level, which results in a relatively large amount of people requiring significant and constant recurring training (Reimer, 1996). Specific selection criteria for technical rescue team membership should be established. Areas of evaluation to consider include educational background, time availability, technical expertise, and trade experience (Reimer, 1996). According to Naum (1993), the personnel component cannot be overlooked. The level of interest, commitment, level of motivation, and acceptance of the technical rescue assignment as part of the overall scope of services can make or break a program.

In Charlotte, North Carolina, the fire department chose to use existing personnel and apparatus to accomplish staffing for technical rescue services. The cost of purchasing apparatus and equipment, as well as additional staffing, would be very high. Instead, equipment was added to already existing apparatus and technical rescue training was simply expanded for existing personnel (Rogers, 1998).

"Funding is the single most common problem when forming a technical rescue team" (Reimer, 1996, p. 32). Several financial issues need to be considered during the planning process. They include, but are not limited to: initial start-up costs, training, tool purchase and acquisition, maintenance, certification, equipment upgrades and replacement, staffing impacts, and certification (Naum, 1995). While traditional budgeting methods can be utilized to offset associated costs, there are several other areas to consider when seeking funding sources. Corporate funding, professional societies and organizations, local businesses and corporations, special fund drives, and surplus equipment allocations are potential options (Naum, 1995). Grant funding should also be considered. Relationships with other city departments in possible need of technical rescue services should also be fostered. Fund drives, user fees, and funding from professional societies are also possible revenue sources (Reimer, 1996). One must also consider the costs associated with a technical rescue team that go beyond the startup phase. Additional costs include maintenance of equipment, training, travel, and staffing (Reimer, 1996). Solicitation of private businesses should also be considered (Naum, 1993).

The current technical rescue operating guideline for the Urbandale Fire Department is based on requesting mutual aid from the Des Moines Fire Department (DMFD) and other surrounding agencies. The Des Moines Fire Department provides technical rescue services in several disciplines, including: high-angle rope rescue, hazardous materials, confined space

rescue, trench rescue, swift water rescue, and ice rescue response. In addition, DMFD also offers limited structural collapse response capabilities (R. Suarez, personal communication, August 24, 2017). The 2016 DMFD budget allotment for technical rescue equipment and personal protective equipment items was approximately $20,000 (T. Patava, personal communication, August 24, 2017). This allotment does not cover hazardous materials funding, which is accomplished through a combination of internal funding and funding through mutual aid agreements. The DMFD is currently engaged in a 28E agreement with seven counties in central Iowa. Each county pays approximately $20,000 for hazardous materials services, while Polk County (where the City of Des Moines is located) pays approximately $250,000 for services. Polk County is also home to the vast majority of hazardous materials response requests (T. Patava, personal communication, August 24, 2017).

The DMFD also offers an annual stipend to the members of its technical rescue teams. Members of the hazardous materials team receive $2,000 per year, members of the water rescue team receive $1,100 per year, and members of the technical rescue team receive $1,100 per year (T. Patava, personal communication, August 24, 2017).

The DMFD operates technical rescue services out of two stations: Station 7 and Station 4. Two different stations are utilized to provide water rescue services: Station 6 and Station 2. Two hazardous materials units are utilized for hazardous materials responses. One unit is used for responses within the City of Des Moines and the second is staffed to cover mutual aid responsibilities to seven surrounding counties (R. Suarez, personal communication, August 24, 2017). The city limits of Urbandale are contained within Polk and Dallas counties. Both of these counties are covered by the DMFD mutual aid agreement.

The DMFD training program for new technical rescue personnel is accomplished through a combination of self-study, job performance requirement skills verification, and routine hands-on scenarios. Initial training begins with the assignment of a "playbook", where specific job performance requirements for each discipline are outlined. One calendar year is allotted for demonstrated competence in all job performance requirements. Skills are then demonstrated and competence is verified by a company officer. Trainees are then required to attend routine hands-on training scenarios in the field in order to become part of the response team (R. Suarez, personal communication, August 24, 2017).

The DMFD has identified several challenges in their technical rescue program. First, they identified that it is important to have a dedicated group of individuals who consistently train in specific disciplines. Technical rescue incidents are relatively low in frequency and high in risk, and it can be a challenge to keep all rescuers proficient in skills performance. The DMFD has also realized the importance of investment in human resources, specifically having an in-house subject matter expert that is well versed in modern technical rescue equipment and techniques. Having this resource available allows for a single person to maintain a training program and schedule and also allows for streamlined equipment procurement and standardized training (T. Patava, personal communication, August 24, 2017).

Departments must consider whether they will consolidate or collaborate, as these two approaches differ. Collaboration occurs when differing agencies work together but remain separate. Consolidation involves the uniting of different departments into one new department (Rielage, 2010). While consolidation has gone well in some places (Los Angeles County, Metro Dade, Florida), it has also failed in others (Warren County, Ohio). The downfall in Ohio occurred as a result of political entities being unable to come to successful resolutions regarding

several issues including land development and commercial acquisitions (Rielage, 2010). Another term for collaboration is regionalization. Regionalization is often viewed as one of the most promising solutions for the fire service. However, many fire service managers and elected officials are threatened by the idea (Rule, 1992).

There are some distinct benefits to joining services. Disproportionate tax rates between jurisdictions can be updated to reflect the new model of service delivery. It should also be noted that entities that are geographically close together but continue to operate as separate individual agencies are very inefficient (Giorgio, 2000). This can lead to duplication of services and efforts, as well as excess capital. Standard operating guidelines can also be unified amongst jurisdictions in order to produce consistent and uniform operations (Giorgio, 2000). Purchasing can be streamlined amongst participating agencies and money can be saved through joint purchasing arrangements (Giorgio, 2000).

Sharing of services can be used to combine specialty departments with other cities or departments to form one uniform operation. For example, the Charlottesville, Virginia, Fire Department combined their Inspections Division (which had been part of the Public Works Department) with the Fire Protection Division (which had been part of the Fire Department). This allowed for the formation of a new single entity, the Building and Life Safety Division (Werner, 1991). Combining dispatch and public safety answering point (PSAP) services is another benefit to collaboration. Automatic-aid agreements and the joint use of technically trained personnel can also be a part of departmental collaboration. The sharing and joint use of facilities can also be accomplished. This can all be done while each department remains independent from the others (Rielage, 2010).

While political obstacles are often difficult to address, another benefit of the sharing of services enables the closest unit to respond to calls for service regardless of the geographical boundaries (Rule, 1992). Sharing of services also allows for specialization of various functions, such as the establishment of a hazardous materials team that was not possible before collaboration (Rule, 1992).

While there are several benefits to regionalization and collaboration of public services, there are also some drawbacks. Drabek, Tamminga, Kilijanek, and Adams (as cited in Singletary, 2003) found four distinct negative aspects to the regionalization approach. These problems include: poor communication between agencies, ambiguity of authority, ineffective use of special resources, and problems associated with an inconsistent media representative to communicate on behalf of the operation.

The literature review performed as part of this project identified several areas of significance that needed to be considered by the Urbandale Fire Department during future consideration of regional technical rescue services. First, the Urbandale Fire Department should consult established national standards and practices for guidance. This will allow UFD to clearly indentify the skill set required of training personnel to the appropriate awareness, operational, or technician level. This would establish the expectations of support personnel as well. Second, a significant amount of planning needs to take place before the UFD and its members move forward to establish a technical rescue team.

Second, an honest and thorough assessment must be made of the jurisdiction, the risks must be identified in the jurisdiction, and a review of past incidents should be conducted. UFD personnel must decide if the establishment of a technical rescue team is warranted. Discussions should be held regarding the establishment of an Urbandale-only team, or if a

regionalized/collaborative team is the best solution. If the establishment of a technical rescue team is warranted, a written plan for the technical rescue team should be established. A training plan must be established. The disciplines that the technical rescue team will be responsible for should be identified.

Third, funding sources for the technical rescue team must be indentified. Funding sources for the initial startup, as well as ongoing associated costs must be determined. In order to keep costs down, consideration should be given to regionalized efforts, reduction in capital, the impact of ongoing training costs, and direct funding sources. Finally, the benefits of a regionalized approach must be considered. Through regionalization, the Urbandale Fire Department could improve the scope of services they can deliver, could help equalize tax rates among other jurisdictions, could help more efficiently staff a technical rescue team, and could allow for a more coordinated closest unit response system.

## Procedures

The action research method was chosen for this project. The action research method is used to apply new information to solve organizational problems (National Fire Academy (NFA), 2013). Since the Urbandale Fire Department does not currently have technician-level technical rescue response capability, the information obtained and the research conducted in this project was used to formulate a plan to enhance technical rescue capability by combining efforts with regional partners in a consolidated approach. The goal of the project was to assess the feasibility of establishing a regional technical rescue team to serve Urbandale, Iowa, and surrounding communities.

To answer research question one, a review of personnel certifications was conducted. Employee records were reviewed as were department maintained training records. Assessment

was made to determine which members of the Urbandale Fire Department had obtained documented training to the awareness, operations, or technician levels in different technical rescue disciplines. Next, a review of available equipment was performed to determine the technical rescue operations that the Urbandale Fire Department was adequately equipped for. A review of all departmental standard operating guidelines and procedures was also conducted.

Research question number two was answered by assessing industry standards on recommended equipment and training for technical rescue teams. An Internet search was utilized to identify applicable standards and training philosophies. This allowed the researcher to identify common themes and commonly used equipment that would aid in the regionalization of technical rescue response. It also allowed the researcher to identify the training needs that would be expected of future technical rescue team members. A series of phone conversations were conducted with regional operational partners to gather information about their response policies, protocols, and procedures. Interviews were conducted with Assistant Chief Tom Patava of the Des Moines Fire Department and Captain Robert Suarez of the Des Moines Fire Department. They were selected due to their administrative and operational roles in the management of Des Moines Fire Department technical rescue services. Phone calls were held on August 24, 2017. During the phone calls, information regarding operational budgets, frequency of technician-level technical responses, and number of required personnel was obtained. This allowed for a baseline assessment to be made regarding the regionalization of technical rescue efforts versus the issues that would result while forming a new stand alone rescue team. A search of the National Fire Academy Learning Resource Center (NFALRC) was conducted to identify any books, articles, or other print resources that could be used as references in the project. Specifically, the search

included inquires on consolidation, collaboration, technical rescue teams, technical rescue equipment, and technical rescue standards.

Research question number three was answered by a similar method. An Internet search engine was used to search for other locations where a regionalized approach was used to address technical rescue needs. As part of the research, efforts were made to assess both the positive and negative impacts of regionalization and collaboration. The researcher also sought out the implications of forming a stand-alone team instead of utilizing a regional approach. Another NFALRC search was carried out to examine the approaches that other entities have used to successfully address a regional approach to technical rescue. Assessments were made to determine how different technical disciplines were accounted for when numerous entities were collaborating on operational response. By conducting this search, the researcher was able to gain insight that was used in the proposal for future action contained at the end of this research paper.

There were some limitations to this project. An investment in enhancing technical rescue capabilities and training would require the allocation of financial assets. As of this writing, the Urbandale Fire Department does not have a specific budget allotment for technical rescue training, equipment, or operations. However, if the department were to commit to enhancing technical rescue response and capabilities, future financial allocations may be available.

Another limitation exists regarding the availability of personnel to staff technical rescue teams. Currently, the Urbandale Fire Department staffs two fire stations with the intent of having two ambulances and two fire suppression pieces available to respond. The intent of this staffing plan does not include the ability to sustain a dedicated technical rescue team. In order to gain that capability, the department would have to increase staffing levels to allow for an assigned technical rescue capability. Or, they would have to cross-train current employees with

the understanding that they may be deployed and not available to handle calls of a non-technical nature.

While this research performed searches for other regionalized technical rescue approaches, it is likely that not all solutions to this problem were identified. Some specific geographical regions were targeted, but this was not an all-inclusive search. Having said that, one limitation to this study is that other solutions may currently exist that were not identified in this project by the researcher.

A limitation to the regionalization of a technical rescue team is the equipment that is available to the stakeholders. One entity may have all of the equipment needed, while other entities own none of the equipment. Should other stakeholders make equipment purchases? What about insurance claims and insurance protection if personnel other than that from the equipment-owning agency use the tools? Should a pro-rated financial obligation be established amongst all stakeholders?

While regionalization may result in better service delivery in some instances, all stakeholders must agree to willingly participate. The fire service is rich in tradition and regionalization of services is certainly a controversial topic. Regionalization can also impact the political environment amongst the stakeholders. Are members of senior leadership (that have the authority to approve regionalization efforts) on board with the changes? If not, why? Resistance to change and the willingness to explore new ideas can be a limitation to regionalization efforts.

Finally, the cost of establishing a regionalized team versus the benefit of having a regional technical rescue team must be considered. The number of actual calls for service on an annual basis is low compared to other non-technical responses (structure fires, fire alarms, emergency medical calls, etc). Technical rescue calls are high in risk, but are also low in

frequency in the Urbandale, Iowa, region. Does the infrequency of calls negate the need to establish an in-house technical rescue contingent? Should technical rescue services just be assigned to mutual aid resources that already have technical rescue capabilities via a mutual aid agreement?

## Results

Research question number one addressed the current technical rescue capability of the Urbandale Fire Department. An analysis of departmental training records and current equipment capabilities was conducted. The Urbandale Fire Department currently has six hazardous materials technicians and 39 employees trained to the hazardous materials operations level. There are 20 employees that have been trained to ice rescue technician level. There was no other documented technical rescue certification from any other disciplines found in a search of departmental training records (UFD, 2017). There was some documented technical rescue training. In 2016, low angle rescue had nine attendees and nine hours of total training, high angle rescue had 51 attendees and 234.5 hours of total training, trench rescue had 20 attendees and 40 hours of total training, water rescue had five attendees and five hours of total training, and vehicle extrication had six attendees and two hours of total training. None of the training entries referenced any job performance requirements, professional standards, or lesson plans (UFD, 2017).

The Urbandale Fire Department does currently own a limited amount of technical rescue equipment. UFD currently has access to rope rescue equipment that allows for operation at the technical rescue level. Current equipment available includes rescue rope in varying lengths, appropriate harnesses, carabiners, and a multi-purpose device used to assist with raising and lowering operations. Edge protection devices, stokes baskets, and numerous segments of

webbing are available. Helmets and gloves are available for all rescuers. The current cache of equipment owned is suitable for both high angle and low angle rescue operations.

The Urbandale Fire Department is currently equipped with hydraulic motor vehicle extrication tools at both of its stations. A hydraulic pump that is carried on response vehicles powers the tools. On one of the vehicles, some advanced hydraulic extrication tools are carried. They include a confined space cutter, short rams, long rams, and several changeable tips that can be swapped out depending on the current extrication predicament. The hydraulic pumps allow for simultaneous tool operation. Other equipment available includes a metal cutting saw, air chisel, high and low pressure airbags, and air shores. A come-a-long, heavy-duty chains, and a large contingent of cribbing are available. This tool allotment allows for both basic and advanced motor vehicle extrication maneuvers.

The Urbandale Fire Department currently carries a contingent of flotation suits that can be used in ice rescue operations. UFD owns an animal catching stick that can be used to secure animals that have fallen through ice. Several personal floatation devices are available to outfit an entire ice rescue team throughout an operation. A cache of throw bags and ropes bags are also available for ice rescue operations. A self-tightening floatation ring is also available for rescuers to throw to victims in the event of an ice rescue.

Limited hazardous materials equipment is available and allows for basic mitigation measures to be conducted. Absorbing booms are available for the containment of spilled materials. Each member of the department is outfitted with an entire ensemble of structural personal protective equipment that includes self-contained breathing apparatus. Adhesive putty is carried to allow for repair of minor leaks. Several small children's swimming pools are available to use as catch bins for leaking material. Peat moss is also carried on response vehicles

and can be used to absorb liquid spillage. Four-gas meters are available to responders to assess air readings. The meters are set up to monitor for oxygen levels, carbon monoxide levels, flammable gases, and hydrogen sulfide. No fully encapsulating hazardous materials suits are available.

The Urbandale Fire Department currently uses a mutual aid agreement with the Des Moines Fire Department (DMFD) to provide technical rescue services that are beyond the capability of the UFD. The DMFD provides response in several technical rescue disciplines including: hazardous materials, water rescue, rope rescue, trench rescue, ice rescue, confined space rescue, and some machinery extrication services (R. Suarez, personal communication, August 24, 2017). The DMFD responded to 58 hazardous materials incidents in 2014, 65 hazardous materials incidents in 2015, and 64 haz ardous materials incidents in 2016. The water rescue team responded to 15 incidents in 2014, 16 incidents in 2015, and 11 incidents in 2016 (DMFD, 2016).

The DMFD offers personnel that participate on these specialty teams an annual stipend for their services. Hazardous materials team members receive $2000 per year, water rescue team members receive $1100 per year, and all other technical rescue discipline team members also receive $1100 per year (T. Patava, personal communication, August 24, 2017).

Research question number two addressed the training and equipment needed to establish a technical rescue team. Review of NFPA standards on technical rescue revealed clear training objectives and job performance requirements for awareness level, operations level, and technician level capabilities. For example, NFPA 1006: Standard for Technical Rescue Personnel Professional Qualifications (2017) requires seven job performance requirements for personnel to be trained to awareness level in rope rescue. The requisite knowledge and skills for

each job performance requirement are listed in the standard. Each technical rescue discipline is outlined in the document. The standard then describes 27 job performance requirements that constitute operations level training as well as the requisite knowledge and skills for each requirement. The standard then outlines six job performance requirements and the requisite knowledge and skills for technician level proficiency. The standard has a similar layout for all of the remaining technical rescue disciplines.

An Internet search found several listings for equipment lists needed for different technical rescue disciplines. The exact list of items needed depends on the jurisdiction and associated hazards. The Indiana Department of Homeland Security Emergency Management Response Division has produced several lists of this nature. An example of one of these lists specific to trench rescue is included in Appendix A.

Research question number three addressed the formats that other regions are using to address the need for technical rescue. The research conducted as part of this project found that several options are available, and each jurisdiction must take a comprehensive, risk-based approach when deciding which format to use. One option to address the need for technical rescue services is to simply establish a technical rescue team for the jurisdiction without regard to other entities. The team would be established using funding, staffing, and equipment that is owned and operated by the jurisdiction without regard to surrounding agencies. This may be the best option for jurisdictions that are large in size or are geographically isolated from other entities. This is also a consideration for agencies that face a higher risk profile and have consistently dealt with calls of a technical nature. An example of this type of arrangement would be the establishment of a technical rescue capability by the Virginia Beach Fire Department that

utilized internal resources and was not done in conjunction with other municipalities (Sargent, 1991).

Another arrangement used by some jurisdictions to address technical rescue needs is to enter a mutual aid agreement and rely solely on the mutual aid partner to provide technical rescue services. Under this type of arrangement, a locality may not establish its own technical rescue team. Some factors that may result in this type of decision include lack of technical rescue calls for service, an acceptable level of risk was noted after a risk assessment, financial constraints, or lack of staffing available.

A third option for addressing the need to provide technical rescue services is a collaborative or regionalized approach. There are both benefits and drawbacks to this strategy. A collaborative approach allows for several entities to work together, combine resources, and provide a higher level of service than was possible if the entities continued to operate independently. This can usually be done in a more efficient and cost effective way. Other benefits to this approach include: closest unit response, central dispatch facilities, lower apparatus replacement costs, enhanced career opportunities, sharing of joint training facilities, specialization of operational functions, cost reduction through volume purchasing, and regionalized public education and pubic information programs (Rule, 1992).

As a result of this project, a proposal was developed for the Urbandale Fire Department to examine and consider a regionalized approach to technical rescue services. This proposal was developed as a conduit to initiate discussion among stakeholders within the region. As of this writing, no current regionalized technical rescue operating plan is in place. Rather, current operational plans consist of mutual aid agreements and individual agencies holding various, uncoordinated technical rescue capabilities.

The proposal calls for stakeholders from all interested agencies to self-assess their own internal technical rescue risks and capabilities. If stakeholders determine that the level of risk within each individual agency requires mitigation in the form of improved technical rescue capabilities, then the stakeholders are encouraged to attend planning meetings regarding regionalization of technical rescue. The proposal for consideration of regionalized technical rescue services can be found in Appendix C.

## Discussion

As a result of the literature review and research carried out during this project, it was determined that the Urbandale Fire Department's current level of technical rescue capability is rather limited. There are several technical rescue disciplines for which the Urbandale Fire Department is not adequately trained or equipped. Some of these disciplines include: industrial extrication and entrapment, confined-space rescue, trench and excavation rescue, structural collapse rescue, surface and underwater rescue, swift water rescue, and hazardous materials technician-level operations. The Urbandale Fire Department would currently summon mutual aid resources to address technical rescue calls of this nature.

There are some technical rescue disciplines for which the Urbandale Fire Department is better prepared. The department currently owns all necessary rope rescue equipment to conduct both high and low angle rescue operations. However, there has been inadequate documented training in this discipline and there is no apparent training plan. Motor vehicle extrication capabilities appear to be adequate at the operations level. To obtain technical level extrication capabilities, more documented training would be required. One of the areas of greatest technical rescue capability for the Urbandale Fire Department is in the realm of ice rescue. All needed equipment is available for a safe operation and annual recurrent training has been documented in

the department's training records. 24 employees attended 88 hours of ice rescue training in 2016 (UFD, 2017).

An analysis of the results shows that in order for the Urbandale Fire Department to form a technical rescue team, there are several technical rescue disciplines that would need to be addressed. Training, equipment, and staffing solutions would need to be developed in order to address these shortcomings.

The implications for the department would require that a comprehensive, risk-based approach be implemented in order to increase the technical rescue capability of the Urbandale Fire Department. A suggested method to accomplish this assessment would be to use the six steps outlined by Feder (2012). These steps include: an assessment of the department and its associated membership and response district, an evaluation of financial resources, assessing current equipment and future equipment needs, establishing training guidelines and a training plan, placing equipment on response vehicles, and setting up a continuing training and education plan.

The information gleaned from the literature review and the research carried out as part of this project identified the applicable NFPA standards that help direct technical rescue training and qualifications. The two NFPA standards referenced as part of this project were NFPA 1006: Standard for Technical Rescue Personnel Professional Qualifications and NFPA 1607: Standard on Operations and Training for Technical Search and Rescue Incidents. Analysis of the technical rescue standards in comparison to UFD training records indicates that the current training being conducted at UFD does not directly reference applicable NFPA job performance skills or requirements in the associated training record entry. Instead, generic labeling is used in the record management system.

Reimer (1996) stated, “Establishing a technical rescue team in your community will require a monumental commitment to training” (p. 34). The Urbandale Fire Department does not have a structured continuing education plan for technical rescue training. An ongoing training agenda and plan will be required in order for the technical rescue team to remain proficient in technical rescue skills. A commitment to the long-term development of the technical rescue team is required (Naum, 1995).

In order for the Urbandale Fire Department to best prepare itself for technical rescue incidents, it must determine which technical rescue disciplines it wishes to address. Once that is done, an initial and ongoing training program should be developed. This program should adhere to NFPA standards and should be documented as such. The implications of these findings demonstrate that a significant amount of planning needs to be completed to not only initiate a technical rescue team, but also pave the way for its continued existence in the future.

Equipment lists discovered during the literature review show that each technical rescue discipline requires several pieces of equipment. An example of such an equipment list can be found in Appendix A. It should be noted that not all pieces of equipment from such lists are mandatory, but should instead be viewed as options for each individual jurisdiction. Each jurisdiction should assess its own needs and capabilities and should determine which disciplines it intends to pursue. An analysis of current equipment carried by the Urbandale Fire Department found that the department is rather well equipped for rope rescue, ice rescue, and vehicle extrication services. If the department decides to participate in the delivery of other technical rescue services in the future, further purchases would be required. Or, the department would have to consider an outside agreement or regionalized approach with another entity to more efficiently procure the needed items. An implication of this finding is that the Urbandale Fire

Department could consider regionalization and collaboration with other entities to gain access to equipment that is currently not available to UFD personnel.

Currently, the Urbandale Fire Department offers some operational capabilities in the ice rescue, rope rescue, and vehicle extrication disciplines. There are several disciplines for which the Urbandale Fire Department does not offer services. The Urbandale Fire Department currently uses mutual aid agreements as one way to provide for technical rescue services demands for which the UFD is not trained or equipped.

Analysis of other regions throughout the country indicates that there are other methods that can be used to address the need for technical rescue services. Fire department consolidation could be explored as an option. Consolidation offers several benefits, including centralized facilities, lower apparatus replacement requirements, use of joint training facilities, cost reductions through volume purchasing, and more (Rule, 1992). Collaboration could be examined. Collaboration allows departments to work together and form joint agreements or memorandums of understanding (Rielage, 2010). This allows departments to remain somewhat independent while also capitalizing on the abilities and resources of collaborative partners.

Another format used to address technical rescue needs is through the direct action of a local agency. Equipment is purchased and staffing levels are enhanced or adjusted to support the newly formed technical rescue team. This was the approach taken by the Charlotte, North Carolina, Fire Department when they utilized existing ladder company personnel to establish their own technical rescue team capability (Rogers, 1998).

When combined with an analysis of technical rescue call type and frequency in the city of Urbandale, these results show that the Urbandale Fire Department is not warranted in a solely independent attempt to address new technical rescue disciplines. There are not enough calls nor

is the risk large enough to warrant the establishment of a technical rescue team. Of all calls in 2016, a review of UFD records found only one call in the technical rescue realm: a single vehicle extrication incident (UFD, 2017).

The implications of these results show that the Urbandale Fire Department would best be served to pursue a collaborative style to technical rescue hazards within the city. The mutual aid approach that is currently in place with the City of Des Moines should remain in place for some technical rescue disciplines. However, some disciplines that may be better addressed through the use of a regionalized or collaborative approach include trench rescue, confined space rescue, and water rescue services.

## Recommendations

This research has led to recommendations that the Urbandale Fire Department can implement to improve its ability to respond to technical rescue emergencies. First, it should be understood that the Urbandale Fire Department already owns sufficient equipment to gain operational and technical proficiency in some technical rescue disciplines. Ice rescue, motor vehicle extrication, and low-angle and high-angle rope services are all available disciplines within which the Urbandale Fire Department could improve their proficiency with no or minimal equipment costs. However, a comprehensive plan to train personnel to appropriate NFPA standards, in both the initial term and the ongoing long term, are not in place. Quality training should be based on sound policy and guidelines. At this point, the Urbandale Fire Department does not have a standard operating guideline to use as a basis for each technical rescue discipline. In order to minimize duplication of effort, the Urbandale Fire Department could consider the adoption of standard operating guidelines used by its main technical rescue mutual aid partner, the Des Moines Fire Department. An example of such a guideline can be found in

Appendix B. Reimer (1996) stated, "…don't reinvent the wheel. There are many successful technical rescue teams across the country; learn from their mistakes and successes". In this case, it would make sense for the Urbandale Fire Department to consider the adoption of DMFD standard operating guidelines to reduce duplication of effort and to streamline operations with a regional partner.

Second, the Urbandale Fire Department should consider direct budgeting for technical rescue team development. If the Urbandale Fire Department intends to improve its technical rescue service delivery, it must address the financial implications of such a decision. If direct budgeting is not an option, other financial avenues should be explored. These include public/private partnerships, funding drives, grants, and seeking donations from local business entities.

Third, as part of the Urbandale Fire Department's efforts to evaluate technical rescue service delivery, it must consider the implications on staffing. The Urbandale Fire Department responded to 3,319 calls for service in 2016 (UFD, 2017) and staff members currently on duty are designated as the frontline initial response force. There is no formal technical rescue personnel allotment. The volume of technical rescue calls does not warrant the hiring of employees that would then be dedicated solely to technical rescue. However, the Urbandale Fire Department should consider increasing the training of a smaller contingent of its current employees to a technician level and should train the remaining majority of its employees to an operational or support level. This would minimize cost and increase technical rescue capability. It would also allow for collaboration with other entities who may use a similar model to enhance overall regional capability.

Fourth, once the Urbandale Fire Department determines which technical rescue disciplines it wishes to pursue further, an analysis of equipment currently on hand should be conducted to determine what, if any, other equipment is needed to adequately prepare the department for technical rescue response. If the Urbandale Fire Department chooses to pursue a technical rescue discipline that it has not participated in before, a list similar to the one in Appendix A should be used as a starting point. From there, the Urbandale Fire Department can decide which pieces of equipment it feels are worth purchasing. It can also identify items on the list that may be owned and operated by a mutual aid partner, thereby reducing duplication of effort and repetitive capital purchases.

Finally, it is recommended that the Urbandale Fire Department undergo a comprehensive, all-hazards technical rescue planning and review process to discuss regional collaboration and joining of efforts to address technical rescue needs in the central Iowa region. All stakeholders should be invited to participate and a plan put in place ahead of time to address technical rescue needs. The six steps used in the establishment of the technical rescue program that need to be addressed in the planning process include: assessing the response district for specific technical rescue needs, evaluating financial support potential, obtaining and purchasing of appropriate equipment, establishing a training program and standard operating guidelines, deciding on equipment location and deployment throughout the response district, and a plan for continuing education, training, and financial support for the program (Feder, 2012). A planning template and questionnaire can be found in Appendix C.

This planning process should be implemented as soon as possible in order to increase technical rescue capabilities in the region. Consideration should be given to the establishment of subcommittees to best handle the six areas outline above. Each subcommittee could then report

back to the larger group and a consensus decision could be made regarding the future movement of the project. Subcommittee use may also allow for a faster completion of the overall project.

This research also has implications for area mutual aid partners and other city departments. In order for a regionalized or collaborative approach to work effectively, all stakeholders must have input on the project, as each is likely to bring its own contribution to the effort. City departments throughout the regional response area may have specific technical rescue needs. These may include areas such as confined space rescue, trench rescue, or advanced hazardous materials response. A regionalized or collaborative approach should be examined as a cost-effective and efficient way to address these unique hazards for all stakeholders.

Future readers should assess their own individual needs and the capacity to address technical rescue hazards and calls for service. Entities must first decide if there is even a need to establish enhanced technical rescue capability or if a mutual aid agreement with an outside agency is a better option. Consideration should be given to a regionalized or collaborative approach as a way to enhance technical rescue capabilities in a more cost efficient and responsible fashion. Consolidation could be considered as a way for multiple stakeholders to merge into a single entity to address technical rescue needs. Regardless of the method chosen, participants must understand that there are both positive aspects and negative aspects to these types of arrangements. It is imperative that these situations be addressed early on in the planning process. Future readers must consider staffing implications, funding implications, training commitments, and equipment storage and acquisition as part of the technical rescue service delivery planning process.

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# Appendix A

Indiana Department of Homeland Security
Emergency Management Response Division
Trench Rescue Equipment List
**Appendix D-2**

| I. Trench Rescue | | | | |
|---|---|---|---|---|
| **Amount** | **Type of PPE** | **Authorized Expenditure List** | **Title** | **Description / Standard** |
| 12 | 4 X 4 Ellis Screw Jack or Pipe Screw Jacks | 03SR-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 8 | 4 X 8 Trench Shore Panels (3/4" Plotorm or 1 1/8" plywood) | 03SR-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 8 | 2" X 12" X 12' Plank | 03SR-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 10 | 2" X 12" X 12' Plank | 03SR-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 20 | 4" X 4" X 12' | 03SR-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 6 | 6" X 6" X 12' | 03SR-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 12 | 4' X 8' ground pads, ½" minimum | 03SR-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 20 | 4" X 4" X 18" Wedges | 03SR-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 40 | 4" X 4" X 18" Cribbing | 03SR-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 20 | 2" X 4" X 18" Cribbing | 03SR-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| **II. Tools** | | | | |
| 8 | 20 oz. or better Claw Hammer | 03SR-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 8 | Carpenter Belts | 03SR-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 8 | 25' Tape Measure | 03SR-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 4 | 18" Folding Shovel | 03SR-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 1 | 8 lb. Sledge Hammer | 03SR-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 1 | Circular Saw, (10 ¼") | 03SR-02-TPEL | Tools, Power, Electric | Electrically-powered portable saws, cutters, breakers, drills, pumps, accessories and attachments. (Certified as compliant with NFPA 1936). |
| 2 | Circular Saw, Spare Blade | 03SR-02-TPEL | Tools, Power, Electric | Electrically-powered portable saws, cutters, breakers, drills, pumps, accessories and attachments. (Certified as compliant with NFPA 1936). |

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Emergency Management Response Division
Trench Rescue Equipment List
**Appendix D-2**

| I. Trench Rescue | | | | |
|---|---|---|---|---|
| **Amount** | **Type of PPE** | **Authorized Expenditure List** | **Title** | **Description / Standard** |
| 12 | 4 X 4 Ellis Screw Jack or Pipe Screw Jacks | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 8 | 4 X 8 Trench Shore Panels (3/4" Pinform or 1 1/8" plywood) | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 8 | 2" X 12" X 12' Plank | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 16 | 2" X 12" X 12' Plank | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 20 | 4" X 4" X 12' | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 6 | 6" X 6" X 12' | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 12 | 4' X 8' ground pads, ½" minimum | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 20 | 4" X 4" X 18" Wedges | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 40 | 4" X 4" X 18" Cribbing | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 20 | 2" X 4" X 18" Cribbing | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| **II. Tools** | | | | |
| 8 | 20 oz. or better Claw Hammer | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 8 | Carpenter Belts | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 8 | 25' Tape Measure | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 4 | 18" Folding Shovel | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 1 | 8 lb. Sledge Hammer | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, mowing, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 1 | Circular Saw, (10 ¼") | 035R-02-TPEL | Tools, Power, Electric | Electrically-powered portable saws, cutters, breakers, drills, pumps, accessories and attachments. (Certified as compliant with NFPA 1936). |
| 2 | Circular Saw, Spare Blade | 035R-02-TPEL | Tools, Power, Electric | Electrically-powered portable saws, cutters, breakers, drills, pumps, accessories and attachments. (Certified as compliant with NFPA 1936). |

Indiana Department of Homeland Security
Emergency Management Response Division
Trench Rescue Equipment List
**Appendix D-2**

| I. Trench Rescue | | | | |
|---|---|---|---|---|
| **Amount** | **Type of PPE** | **Authorized Expenditure List** | **Title** | **Description / Standard** |
| 12 | 4 X 4 Ellis Screw Jack or Pipe Screw Jacks | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, moving, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 8 | 4 X 8 Trench Shore Panels (3/4" Pinform or 1 1/8" plywood) | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, moving, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 8 | 2" X 12" X 12' Plank | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, moving, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 16 | 2" X 12" X 12' Plank | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, moving, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 20 | 4" X 4" X 12' | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, moving, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 6 | 6" X 6" X 12' | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, moving, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 12 | 4' X 8' ground pads, ½" minimum | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, moving, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 20 | 4" X 4" X 18" Wedges | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, moving, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 40 | 4" X 4" X 18" Cribbing | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, moving, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 20 | 2" X 4" X 18" Cribbing | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, moving, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| **II. Tools** | | | | |
| 8 | 20 oz. or better Claw Hammer | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, moving, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 8 | Carpenter Belts | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, moving, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 8 | 25' Tape Measure | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, moving, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 4 | 18" Folding Shovel | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, moving, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 1 | 8 lb. Sledge Hammer | 035R-02-TLHN | Tools, Hand | Manually operated hand tools, cutting torches, exothermic torches, accessories and attachments for cutting, prying, breaking, shoring, stabilizing, moving, applying or removing fasteners where powered tools are not appropriate or safe to use. |
| 1 | Circular Saw, (10 ¼") | 035R-02-TPEL | Tools, Power, Electric | Electrically-powered portable saws, cutters, breakers, drills, pumps, accessories and attachments. (Certified as compliant with NFPA 1936). |
| 2 | Circular Saw, Spare Blade | 035R-02-TPEL | Tools, Power, Electric | Electrically-powered portable saws, cutters, breakers, drills, pumps, accessories and attachments. (Certified as compliant with NFPA 1936). |

Appendix B

**Purpose**

To provide guidelines for safe operations at trench or excavation rescues. These incidents are known to present considerable hazards to rescuers, therefore a well-disciplined technical rescue response is required. The DMFD shall not allow the entry of any personnel into any incident in which a patient is trapped, buried, or experiencing a medical emergency in a trench or excavation until a technical rescue response has been assembled on scene and the Incident Commander has declared the area safe for entry.

**Responsibility**

Definitions

(OSHA Regulation 29 CFR 1926.650)

TRENCH - a narrow excavation in relation to its length made below the surface of the ground. In general, the depth is greater than the width, but the width is not greater than 15 feet.

EXCAVATION - a man-made cut, cavity, trench or depression in the earth's surface, formed by earth removal. Usually wider than it is deep.

Response

Upon notification of a trench/excavation emergency, the following assignment shall be dispatched:

| | |
|---|---|
| 1 Extrication Engine | Support |
| Medic Squad | EMS |
| 1 Hazardous Materials Unit | Air monitoring |
| 1 District Chief/Shift Commander | Command |
| District Chief of Special Operation | Operations |
| Technical Rescue #7 | Technical Rescue |
| ( Engine #7 & Medic #7) | |
| 1 Truck Company or Engine | (nearest) |

Outside City Limits

| | |
|---|---|
| District Chief of Special Operation or designee | |
| Lieutenant of Special Operation | |
| Technical Rescue #4 | Technical Rescue |

| | |
|---|---|
| ( Engine #7 & Medic #7) Minimum 5 Techs | |
| Medic Squad | (Closest) |

Staffing and Equipment

The Incident Commander (IC) is responsible for overall management of the incident. IC shall assure there is an adequate number, no less than six (6) Trench rescue technicians on scene for the rescue or recovery operation.

**Arrival and Size Up**

1. The Incident Management System shall be initiated by the first arriving company and will be maintained throughout the incident.

2. Apparatus shall be positioned no closer than 100 feet from the site unless conditions permit closer.

3. All bystanders shall be removed from the site and all motorized equipment shall be shut down.

4. The following shall be determined as soon as possible:
    a. Secure a "Responsible Party," job foreman or witness to the accident.
    b. What exactly has happened.
    c. How many victims there are and their possible locations.
    d. Assess potential hazards.
    e. Attempt to determine extent of the victim(s) injuries.
    f. Attempt to determine how long the victim(s) has been trapped.

5. A risk vs. benefit analysis shall be done to determine if the operation will be conducted as a rescue or recovery. The decision shall be reviewed throughout the operation.

6. Consider the need for additional resources:
    a. Specialized equipment (i.e., aerial ladder or vector truck)
    b. Additional trained personnel (on or off duty)
    c. Additional non-trained personnel (i.e., Truck or Engine company)
    d. Lumber for shoring
    e. Additional command staff

**Pre-Entry Operations**

1. Every effort shall be made to remove all bystanders, non-essential personnel, motorized equipment, traffic, and other obstructions from the area.

a. A HOT ZONE shall be established extending 50 feet out from the trench/excavation. Only essential rescue personnel shall be allowed in the HOT ZONE.
b. A WARM ZONE shall be established extended 50-150 feet out from the trench/excavation. Only authorized support personnel shall be allowed in the WARM ZONE.
c. A COLD ZONE shall be established extending 150-300 feet from the trench/excavation. Non-essential civilians shall be confined to the COLD ZONE.

2. Trenches should be approached from the ends if possible.

3. All hazards shall be removed (i.e., utilities, water in trench, surcharge loads).

4. Haz-Mat or Tech Rescue shall conduct atmospheric monitoring and ventilate the trench as necessary.

5. Evaluate and identify soil type and condition.

a. It should be assumed that Class C soil exists at all trench/excavation emergencies.

b. Look for signs of additional collapse (i.e., fissures, unstable spoil pile)

6. Place ground pads.

7. A DMFD Confined Space Entry Permit shall be completed.

**Stabilization and Shoring**

1. A minimum of two egress ladders shall be placed in the trench, no more than 25 feet apart.
2. Determine the type of shoring to be used, with every effort being made to utilize equipment that does not require entry into the trench (i.e., speed shores).

3. Begin shoring, using approved methods, to create a SAFE ZONE inside the trench/excavation for rescuers to operate.

4. Entry shall not be made until the Incident Commander has evaluated the SAFE ZONE and declared it ready for entry.

**Entry Operations**

1. Rescuers entering the trench shall be equipped with a minimum of long sleeve shirt, long pants, steel-toes boots (fire boots), leather gloves, helmet, eye protection, and a Class III rescue harness.
2. A tag line of safety rope shall be attached to rescuers prior to entry.
3. Rescuers shall remain inside the SAFE ZONE at all times.
4. Rescuers shall remove collapsed earth or material while advancing toward the victim(s).
5. Shoring operations shall progress along with the rescuers so that the SAFE ZONE moves with the rescue effort.
6. Rescuers shall secure all unsecured utilities, pipe, or any other obstructions in the trench/excavation.
7. The SAFE ZONE must extend around the victim(s) before treatment and/or removal can be conducted

**Treatment Packaging and Removal**

1. Every effort shall be made to clear the patient's airway and upper body first.
2. Assessment and treatment shall begin as soon as possible, given safety considerations and victim(s) body position.
3. Airway control, ventilation, oxygen administration, IV therapy, and bleeding control may be accomplished before the victim or victims is/are totally uncovered.
4. Continue to uncover and disentangle the victim or victims until he/she/they are free.
5. Apply C-spine precautions as soon as possible.
6. Consideration shall be given to delivering definitive medical treatments before removal.
7. Local medical protocols shall be followed.
8. Package patient(s), given medical condition and method of removal used.
9. Remove victim(s) using the safest and most efficient means possible.

**Termination**

1. Upon removal of the last victim, all rescuers shall be removed from the trench/excavation and all personnel shall be pulled back to the WARM ZONE.

2. A Personnel Accountability Report (PAR) shall be conducted and all personnel must be accounted for before proceeding.

3. Consider contacting OSHA before removing any equipment, in order to assist them in subsequent investigations.

4. A brief on-scene critique of the incident shall be conducted, followed by a more formal critique at a later time.

5. Remove all tools and equipment from the trench/excavation, remaining in the SAFE ZONE at all times.

6. Remove shoring in reverse order (i.e., last in, first out).

7. Clean and replace all equipment.

8. Consider C.I.S.D.

Appendix C

**Technical Rescue Regionalization Exploration Planning**

Date:

Departments Present:

Meeting Location:

Note Taker:

This document is to be used in a linear fashion to explore technical rescue regionalization and collaboration efforts in the central Iowa region. This document is for planning purposes only and shall not be used as an official decision regarding potential changes to technical rescue calls for service in the central Iowa region.

## Step 1: Department and Response Area Assessment

1) Is a regional technical rescue team actually needed, or is it just wanted? Why or why not? Consider things like: the volume of technical rescue calls, unique rescue hazards, community risk profiles, current amount of construction in the area, etc.

2) Can the area accommodate the logistical challenges that come along with technical rescue team formation? Consider things like: scheduling, overtime, staffing, funding, and morale and motivation.

## Step 2: Evaluate the Potential for Adequate Funding

1) Discuss expectations regarding each member of the potentially regionalized approach and their financial commitment. Can each member commit to the project? If not, are there financial options available to assist?

2) Consider establishing a subcommittee to address potential funding resources. Possible sources of funding include: budgeting, fundraisers, loans, community donations, grants, public/private partnerships, and donations from prominent businesses in the community.

## Step 3: Equipment

1) What technical rescue disciplines does the regionalized team desire to cover? What equipment is necessary for each of those disciplines? Do any of the regional members already possess some of the equipment? Is there potential to share equipment?

2) Are there any subject matter experts within the region that have a greater degree of experience with technical rescue equipment than others?

3) What equipment is needed? What equipment would be nice to have, but is not actually needed?

4) Is there a single vendor that could be used to streamline all technical rescue equipment purchases? What vendors are potential options?

## Step 4: Establishing a Training Plan

1) What training will be required? Where is it going to be held? Who is going to instruct the training evolutions? Are there train-the-trainer opportunities?

2) To what standards will technical rescue members be trained? How many technician-level rescuers will there be? How many operations-level rescuers?

3) What equipment will be used for training?

4) What will be the operational guidelines for the organization? Will there be a standardized set of operating guidelines?

5) Does the team wish to obtain national certification?

6) What initial training is required to join the team?

7) How is training going to be paid for?

8) How will training be documented?

## Step 5: Equipment Placement and Deployment

1) Which members of the regionalized team are responsible for which technical rescue discipline?

2) What vehicles will be used to carry equipment? Which stations will they be housed? Are the members of the regionalized effort able to provide the staffing needed for the technical rescue response?

3) Is there a color-coding option that can be used to maintain equipment organization and assist with equipment familiarization?

## Step 6: Contingency Planning

1) What is the plan for continued, ongoing training? Who is responsible for planning and conducting this training?

2) Will monthly in-station training drills be planned? What about quarterly or annual scenario-based training?

3) What is the plan for adding members to the team? What is the plan when members no longer desire to be on the team?