Search and Rescue

Definition and Basic Objectives

Every fire fighter knows that the rescue of people in danger is the primary objective of a fire company and the first duty to be performed at the scene of a fire. However, not every fire fighter realizes that rescue duties involve much more than the bodily removal of people who might be trapped. Although carrying a fire victim to safety is rescue in the purest sense, rescue work includes many other operations.

Raising a ladder for use by entrapped occupants, assisting or directing people from the fire building, and searching for victims in the building are all rescue operations, each of which immediately reduces danger to human life. Rapid ventilation removes accumulations of smoke and gases and prevents their further buildup. Proper placement of the first hoselines at a fire can keep the fire away from people in the building. Both operations reduce the danger to entrapped occupants and extend their time to get out of the building. In a very real sense these, too, are rescue operations.
Many fire fighters tend to think of rescue only in connection with hospitals, nursing homes, schools, hotels and other occupancies containing many people. Such buildings must receive careful consideration in terms of rescue problems because of the number of people involved, but fires in one and two family dwellings very often require rescue operations. A review of national statistics shows that injuries and deaths in dwelling fires far outnumber those in other occupancies.

For truck companies, rescue is a complex operation. Almost every rescue situation calls for a different combination of evolutions, equipment and other operations. These can include forcible entry, interior search, placement of ground ladders, and ventilation.

**Strategic Priorities**

Preparation for rescue begins well before the alarm is received. It begins with building and area inspections and continuing study of the company's district to determine the occupancies, the people involved, the hazards, the potential rescue problems, and the most effective apparatus placements. The objective is to know in advance the approximate type and extent of rescue operations that might be required at any fire.

**SIZE-UP:** Once at the scene the officer should continue with careful size-up, taking into consideration visual observations to establish priorities, i.e., extent of the fire, the size and age of the building, and its apparent population, in relation to the time of day, are important in ascertaining what rescue operations are needed. Some of this information would have been obtained in pre-fire inspections. Other size-up information can be obtained from neighbors and from tenants who have escaped the fire building. Of special urgency are reports that people are still inside. On the other hand, reports that “everyone is out” might be erroneous and should not deter fire fighters from starting search operations, especially in multiple-family residences. The size-up will indicate where search and rescue operations should begin. The company officer should also consider the risk/benefit of conducting rescue operations. What is the likelihood of viable victims based on conditions on arrival?

The Rescue Group Leader must consider whether direct or indirect rescue operations are indicated.

**Direct Operations Include:**

1. Removing victims from areas of immediate danger.
2. Searching for and locating victims within the structure.
3. Actions that provide egress to victims and/or areas where victims are likely to be found.
Indirect Operations Include:

Ventilation operations in support of rescue. Does the situation require that the building should be ventilated as soon as possible to allow smoke and gasses to move away from any occupants who could be trapped?

Isolating involved areas of the building. With limited resources, it may be better to isolate involved areas with ventilation or the closure of openings to hold the fire in check until rescue operations can be completed.

Moving victims to areas of safe refuge, particularly in multi-story buildings until the fire can be controlled or access to the victims can be achieved.

**Tactical Consideration**

- Company unity. Two man task teams.
- Equipment needed.
- Access (apparatus placement as well as entry to the building)
- Rescue Plan
  A. Rescue plan includes:
     1. Designate search teams and areas to be searched.
        a. Search Team responsibilities
           1. Entry and escape plan
           2. Location of victims through a systematic search
           3. Removal of victims to a designated safe refuge area
           4. Completion of primary search
     2. Designate safe refuge area.
        A safe refuge area is the closest location that removes victims from hazards, an SRA (Safe Refuge Area) is a point where victims are transferred from search teams to treatment teams, this area must remain manned at all times. Complexity of problem will determine this location, it could be the front yard on a single family residence or 2 floors below the fire or on the roof in a highrise or maybe a vacant lot during an earthquake rescue situation.
     3. Assign treatment teams.
        Treatment team receives victims from search teams and performs initial triage, treatment and evacuation or transportation.

**Type of Construction**

- Building Materials
- Lightweight vs. Conventional
- Building configuration, design and hazards

**Type Occupancy**

The information received with the alarm can be the first indication that a rescue problem exists. The initial information might include an exact address or a more general location such as a street intersection. From this information, truck company personnel should know the type of occupancies involved or the type of area to which they are responding. This knowledge and the time of day are two very important clues to the possible presence of victims in the fire building and to the type of rescue problems likely to be involved.

**Apartments**

Consider the number of stories and any potential access problems. The time of day is an important factor as occupancy will increase in the evening hours. Also consider the building design. Does the apartment building have a center hall construction or is it a "garden" type with each unit having an exit directly to the outside?

When making a search of an apartment
building, be sure to first check the areas most vulnerable to spread. For example, if the fire is at the end of a corridor or center hall, search the apartments closest to the fire first. Next, check the remainder of the hall, and then the floor immediately above. In the case of a garden type apartment, immediate consideration should be to check apartments that share exit landings or alcoves, as well as the apartment(s) above the fire.

**Transient housing**

Transient housing, such as hotels, motels, etc. pose many of the same problems as apartment buildings. However, it is important to note that many occupants will not be familiar with the building and exiting procedures, increasing the potential for rescue.

**Industrial**

The time of day will likely determine the rescue potential and company commanders should be aware of companies that have multiple shifts. Also consider process and/or machinery that will complicate rescue operations. If available, locate a responsible party at scene, such as building engineers and/or security personnel to get information on likely locations of occupants as well as hazardous processes or storage. Many industrial occupancies (as well as commercial) often have vast floor areas making search difficult. In these cases, rope bags are indispensable and can be used in combinations by hooking them together or by tying them to the nozzle end of a hose line in order to extend the search coverage after the reel line is lead in to the fullest extent.

**Schools/Institutions**

Be aware of the high potential of victims who may or may not be able to help themselves such as young school children or (persons confined to beds) in institutions. Cases such as these will require additional resources. Where possible it is advised to use the staff of these facilities because of their knowledge of evacuation procedures and location of non-ambulatory victims.

**Commercial**

Consider the size of the building and floor plan. Many retail stores have large floor areas with many obstructions. Victims are likely to be quickly disoriented because they are not familiar with the building.

**Immediate Rescue**

Immediate rescue, at the expense of other truck company operations, must be attempted in extreme cases—such as when an arriving company finds occupants about to leave the building by jumping. In such situations, first arriving units must delay all other operations in favor of raising ladders. They must get the attention of victims to make it obvious that rescue is under way and must talk to the victims to calm them until they can be brought down. It is important that the truck company be prepared, equipped, staffed and trained for efficient rescue operations in the most complex structure in its District. As an extreme example, if an area contains only single-family dwellings, with the exception of one nursing home, truck companies in that area must be as well prepared for rescue operations at the nursing home as they are for operations at the dwellings.

At any fire, but more often in larger occupancies, the rescue problem can be great enough to tax the capacity of the first units at the scene. If it is apparent or even suspected that such a rescue problem exists, additional companies should be called without delay.
Search

Search consists of the procedures necessary to examine closely and carefully for a victim and initiate prompt action to remove them from imminent danger. Always keep risk vs. benefit in your mind when preparing a search plan. Keep in mind that this plan includes the location of the fire and all potential problems.

Initial on scene companies should always initiate the “Primary Search.” This is a rapid search of all involved and exposed areas affected by the incident. The emphasis should be on a rapid scan of the area to be searched. Perhaps no other operation demands as much cooperation and coordination between truck and engine companies. If Search Teams are to search around and above the fire, they must know that the fire is under attack and that attempts are being made to block fire spread. To use their lines effectively, engine companies might require truck operations, such as ventilation, laddering and forcible entry. These operations may also be required before the search can begin.

It is extremely important that every firefighter at the scene be aware that a search is in progress. All activity should be directed toward assisting Search Groups and providing protection for them and for any victims they may find.

Complexity of the rescue problem will determine the number of Search Groups needed to assist in the search, to remove victims and to provide medical treatment. The Search Group that finds the victim in a complex problem may not be the group that removes the victim or treats the patient.

Size up of the occupancy in respect to life hazard is the first consideration. Type of occupancy, time of day, size of occupancy, condition of the structure, will immediate ventilation be of assistance in the search. Determine entry/exit points and possible escape routes, victims and their locations. You should also secure the utilities. Primary search team members should always be cognizant of possible points of origin and other information that will be of assistance to the company officer with first in jurisdiction. In order to initiate a rapid search, a reel line off the first in engine company makes a good life line, particularly at fires involving single family dwellings.

A Secondary Search must be conducted as soon as possible after completion of the Primary Search. A Secondary Search focuses on a thorough and complete inspection of the area searched during the Primary Search. The emphasis in this search phase is to guarantee that no victims are left in the building. If possible do not use personnel assigned to Primary Search for the Secondary Search so that a different perspective is achieved.

Search Markings

A. It is understood that search markings would be used in situations according to the complexity of the exercise for example, you would possibly not use search markings on a small single family residence where a single search team is being utilized but would probably use search markings on a high rise incident where it is likely that multiple teams are being used. (Figure 1).

B. There are four markings used at the entrances to buildings and individual rooms.

(1) An arrow is drawn on or near the opening used to enter the building.
(2) An arrow with a slash through it indicates that the opening or door is not to be used as an entrance to the building or room.

(3) A single diagonal slash is drawn on or near the arrow by the building or room entrance to indicate that a primary search has begun inside that building or room.

(4) A second crossing slash is drawn through the first slash when the primary search has been completed.

It is important that a number of operations be carried out simultaneously, or as near as possible in any rescue situation. While following a standard search procedure, truck crews should perform the following duties, the first being by far the most important:

- Locate and remove trapped occupants
- Ventilate where needed
- Temporarily prevent extension of fire by closing doors and windows
- Check for interior and exterior fire extension
- When necessary, help locate the seat of the fire

**Ladder Rescue**

Ground ladders are used in many ways to help remove people from a building. The ladders can be placed at windows, balconies or fire escapes so occupants can climb down or be carried down. No matter how ground ladders are to be used for rescue, the first ladders should be raised to the victims closest to the fire. These are usually the victims on or above the fire floor. However, smoke and other products of combustion may be endangering victims further away from the fire. This might require that the ground ladders be placed in that location.

It is important to select the proper ladder length for the raise. If you pick the wrong size ladder you could strand victims on higher floors who cannot be reached. Also, a ladder that is too long must be placed at an awkward climbing angle or placed so that it blocks part of the opening to the window.

As a ground ladder is being raised it should be kept from the victims' reach, so they will not be tempted to reach for it while the ladder is being raised. When the ladder is being raised past some victims to reach others on the floor above, it is extremely important to keep the ladder from the building so that victims cannot get hold of the ladder and hinder operations.

When a ground ladder is placed at a window for rescue, the tip should be at or just below the level of the sill (Figure 2).

In placing a ground ladder at the front railing of a balcony or fire escape, or at the wall beside them, two to four rungs should extend above the railing to provide a good handhold for victims or firefighters climbing onto the ladder (Figure 3 & 4).

If floors being searched for victims by firefighters who entered through interior stairways can be reached with ground ladders, they should be raised, so they can be used as emergency exits for firefighters and victims. The ladders will provide additional exits for firefighters in areas which are not close to stairways or become impassable.

Ground ladders being used as exits should be placed at the hallway windows if their locations
are known. Firefighters should know where the ladders will be through visually locating them or radio communications.

**Aerial Ladder Rescue**

Although it is best to remove the victims from the building through interior hallways, there might be times when the aerial unit could be used to remove the victims. There could be victims standing on balconies or hanging out windows calling for help and the conditions inside might be too untenable to attempt a rescue from the interior.

In spotting Aerial Unit for rescue, it depends on how many and the location of the victims, and you should try to consider the wind direction. Try to spot Aerial Unit up wind from victims and rescuers, whenever possible to avoid heat and combustion products.

When victims to be rescued are located some distance from each other, the Aerial Unit should be spotted between them. This will save you time in respotting the Aerial Unit for each victim. Also, the Aerial Unit can be positioned at the corner of a building to gain coverage of both sides.

Always try to make visual or verbal contact with victims who are being rescued or waiting for rescue. This might calm them down, so they will stay in the building. Remember, they will be anxious and frightened and may do something to injure themselves or the rescuer.

When extending aerial ladder or platform always raise unit above victims, then lower down to them, this will reduce the chances of the occupants reaching or jumping for the ladder or platform while it is being raised (Figure 5).
The tip of the ladder or the top rail of the basket should be placed carefully with respect to the window, balcony or fire escapes. This should allow for easier and safer removal of victims from the building. If you place the tip of ladder too far in a window it could block access through window for victims and firefighters. This is also true for balconies and fire escapes (Figure 6). The aerial platform top rail should be placed even or slightly below window, fire escape and balcony railing. This will allow easier and safer access to victims and firefighters.

When removing victims from a building with an aerial ladder, you should have a firefighter assigned to assist occupants onto ladder. Small children and unconscious or injured victims must be carried down ladder. For safety, a backup firefighter should assist the firefighter carrying the victim down ladder (Figure 7).

NOTE: Remember, rescuing occupants should be first attempted from interior stairways. Rescuing victims with Aerial Units is time consuming and takes manpower away from other important duties which may enhance the rescue efforts more efficiently, such as ventilation.

**Confined Space Rescue**

What is a confined space rescue?
A confined space rescue is defined as an area that:

- Is not designed for continuous human occupancy

**Types of Confined Spaces**

A. Storage Tanks  
B. Sewer Systems  
C. Tunnels  
D. Underground Utility Vaults  
E. Pipelines  
F. Mines  
G. Pits, Trenches and Excavations

**Two Classes of Confined Spaces**

A. A permit-required confined space is one that is immediately dangerous to life or health (IDLH) or may become IDLH.

B. A non-permit confined space is a space which does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

NOTE: All confined spaces must be considered IDLH until positively identified as otherwise.
Two Major Categories of Hazards in Confined Spaces

A. Hazardous atmospheres
   1. Oxygen deficient atmosphere
   2. Flammable/Combustible gases or vapors
   3. Toxic gases or vapors

NOTE: Monitoring of the atmosphere in a confined space must be done prior to entry and during the entire rescue operation.

B. General Safety Hazards
   1. Mechanical Hazards, such as machinery
   2. Electrical Hazards—these must be deactivated
   3. Entry and Exit restrictions
   4. Communication difficulties
   5. Physical Hazards such as:
      a. Unstable Soils
      b. Movement Restriction
      c. Temperature Change
      d. Underground Water
      e. Debris

Scene Preparation

Upon arrival at a confined space rescue incident the First Arriving Officer should obtain pertinent information and assure the completion of the following steps:

1. Assessment
   a. Size-up: complete size-up report outlined in the Incident Command Procedures (10-1-1) will be used.
2. What type of space is it?
3. Are there product storage hazards?
4. Locate and secure the job site foreman or a reliable witness.
5. Determine location and number of victims.
6. Obtain blueprints, maps or have on-site personnel draw sketch of the site.
7. Make a conscious decision as to whether this is a “rescue or recovery.”
8. Determine number and location of entry points.
10. Start ICS Command worksheet.
    a. Exclusionary Zone: Preferred 50 foot perimeter.
2. Manpower and equipment
3. Make general area safe
    a. The primary hazard to consider in a confined space is the potential for hazardous or oxygen deficient atmosphere.
    b. Assign a Safety Officer as soon as possible.

Rescue at a Building Collapse

Control and organization are one of the most important objectives of a collapse rescue operation; without them, rescue and removal can become a mob scene. It is extremely difficult to control and organize a rescue effort at a collapse which suddenly occurs during a fire, where large numbers of firefighters on the scene rush to the collapse area to dig out other buried or trapped firefighters. Our first reaction is to search for victims, which is ineffective when it is done without knowledge of where the victims are buried. Even when the exact location is known, the fewer the rescuers engaged in the actual rescue work the better. It is the quality of effort, not the quantity, that is needed in such situations.

The best way to gain control of a collapse rescue effort is for the officer in command to develop a
rescue plan and issue specific assignments to accomplish the plan.

**Standard Collapse Rescue Plan**

1. Survey the site of collapse; determine potential dangers to rescue personnel. Request additional resources: USAR, medical assistance, etc.

2. Shut off all utilities, such as gas, electricity, and water which could injure trapped victims and rescuers.

3. Search for and remove surface victims first.

4. Search all voids and spaces created by the collapse structure.

5. Start selected debris removal digging to areas where victims could be trapped.

6. Start general debris removal to clear the entire collapse rubble.

All available rescue tools should be brought to the vicinity of the rescue. At night, portable lights will be needed, shoring material, air bags, portable jacks and spreading bars should be made available at the scene.

One of the most important assignments to be undertaken is the shutting off of utilities to the collapsed structure. Doing this will eliminate a lot of potential hazards which are created by different utilities.

Our department has implemented Rapid Intervention Teams for first alarm assignments. The R.I.T. shall consist of a single engine company at a minimum, and may be expanded to include multiple units, engines, trucks and USAR units based on the hazards of the incident and the needs of the Incident Commander.

Rapid Intervention Team (R.I.T.): A term used to describe a company of personnel assembled in full readiness for rapid entry and rescue of trapped firefighters. Personnel assigned to an R.I.T. shall be fully equipped with PPE, SCBA, separate hose lines, water supply, and specialized rescue equipment given the specific hazards involved.


**Summary**

Rescue is one of the prime objectives of fire companies and the basic reason for their existence. Fire fighters must expect some personal risk during rescue operations.

To minimize this danger, the operations required in rescue situations are part of our standard operating procedures, and fire fighters should receive continual training in these operations. These procedures should include a standard search pattern that is simple to perform and thorough in its coverage of the fire building.

Search and Ventilation are the main functions of truck companies in a rescue situation along with Forcible Entry and Laddering. However, because any fire fighter might be required to conduct a search, they all should know the standard search procedures. Above all else, risk vs. benefit must be the guiding factor when initiating and conducting these operations.