Ladder Company Operations

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Purpose

Ladder companies carry specialized equipment for specific operations, including forcible entry, search, and ventilation. They have at their disposal all the capabilities of the highly specialized aerial apparatus itself. The purpose of this guideline is to identify those circumstances when ladder company operations may appropriately be conducted by other units, and when situations require the specialized equipment found on the ladder. This guideline further addresses the responsibilities of the ladder company on the fireground, as defined by the Albuquerque Fire Department.

Guideline

Many functions must be accomplished to achieve a successful outcome at any fire incident. Delivery of water to the seat of the fire is the operation that saves more lives and protects more property than any other fireground operation. Operations which assist in the effective delivery of water by engine companies are referred to as “support functions.” Rescues, squads, and ladders perform these support functions.

It is incumbent upon ladder company personnel to control and direct fire conditions (or fire behavior), support the delivery of water needed for fire control, and to control the fire building’s environment as much as is possible.

Operational Guidance

I. Ladder company operations

A. Specific ladder company operations include the following:

1. Search.

   a. The purpose for conducting search operations is to locate and remove victims from the fire environment.

   b. The incident life hazard profile must be determined and appropriate actions taken as is deemed necessary.

2. Forcible entry and establishing exits.

   a. To provide a rapid and safe entry into the fire building and a safe egress from it.

3. Ventilation.

   a. "Venting for fire" is a tactic that allows the fire attack team to enter and operate within the structure by providing an exit for heat and products of combustion; thus improving visibility and lowering heat within the structure so the attack team can advance more easily to the seat of the fire.

      i. This ventilation method must be closely coordinated with the fire attack team so as not to increase fire and smoke spread.

   b. "Venting for life" is performed in a specific area with the objectives of providing fresh air for occupants to breathe and improving visibility for searchers.

      i. As soon as a life hazard is recognized, venting for life should immediately begin.

      ii. It must be understood that venting for life may intensify the fire; the purpose is to draw the fire away from the life hazard, not necessarily vent the structure.

      iii. The possible increasing of fire spread is acceptable under this condition and such action must be communicated to Command and all crews on scene.

4. Laddering the fire building.

5. Loss control, including salvage and overhaul duties.

6. Utilities control.

7. Delivering effective aerial master streams.

B. Fireground needs usually exceed the available staffing of Ladder Companies, so resource utilization and prioritization is crucial.

C. The four critical areas where ladder functions must be completed are the following:

1. The building roof.

2. The rear of the fire building.

3. The fire floor.

4. The floor above the fire.

D. Some of the equipment found on ladder companies is found on other units.

1. These tools include halligan bars, axes, K-tools, A-tools, 24-foot extension ladders, and utility rope.

2. All units are capable of performing common tasks, such as conventional and through-the-lock forcible entry, basic laddering, and ventilation.

E. Some equipment found on ladder companies is unique and can determine fireground assignment priorities.

1. Specialized equipment found on ladder companies includes the rabbit tool, the K-12 tool, and chain saws, the cutting torch, the thermal imaging camera, and CO detectors.

2. Because they carry specialized equipment, Ladder Companies should typically be assigned according to the need for specific tactical operations.

3. Examples:

a. When vertical ventilation is required at a fire, only Ladder companies have the equipment necessary to complete the required tasks.

i. Vertical ventilation is a true "ladder function."

b. The presence of overhead doors, excessive iron bars, multiple doors, or locks to force, are forcible entry situations that call for equipment carried solely by ladder companies.

c. An engine company encountering an inward-swinging, dead-bolted, wooden door in a wooden jamb during an initial attack should utilize the irons to force the door (and not require the assistance or specialized tools of the ladder company to gain access).

4. The aerial apparatus itself should be regarded as a specialized "offensive" tool used to complete ladder company operations.

a. Aerial apparatus should be positioned on-scene for “offensive” operations that include both equipment and resource delivery to the front of the structure, and effective aerial master stream delivery.

II. Assignment of ladder company operation duties

A. Several factors need to be considered when deciding which tactic will be assigned to ladder company personnel, including the following:

1. Building size, construction, interior arrangement, and the effect the fire is having on building.

2. Fire size, location, stage, and direction of travel.

3. Occupancy.

4. Life hazard.

B. All companies should be capable of completing basic ladder company operations if tasked to do so by the Incident Commander.

C. Factors which may cause reassignment of duties:

1. Ladder functions are often necessary well before the arrival of a Ladder Company.

a. Engine companies have the tools and training to provide entry and exit ventilation openings and PPV fans to carry out positive pressure ventilation.

b. Although ventilation is generally considered to be a ladder company operation, this example illustrates an effective use of available resources, especially if the Ladder Company has a slower response time to the scene.

D. The initial stages of a single family dwelling fire exemplify how search, a vital ladder company operation, is accomplished by members of other crews.

1. Example:

a. With the arrival of the first unit (typically an engine or rescue) at a single-family dwelling, Command is assumed and an Incident Action Plan (IAP) begins.

b. It is standard practice for AFD to have the first-in engine company begin fire attack and search for victims in the area of the fire's origin.

c. The first-arriving rescue should assume one of two roles depending on the situation.

i. OSHA regulations state that if "no known life hazard exists", a two-out RIT must be established.

ii. The rescue becomes the initial two-out RIT (IRIT) and the rescue officer assumes Command from the fast-attacking engine officer who was the initial IC.

iii. In only two situations may the the two-in / two-out rule be broken:

- If the fire is in the incipient stage, does not require the use of PPE, and can be controlled with a portable fire extinguisher.

- A “known life hazard” exists, and the rescue will immediately undertake a primary search.

2. The reality is that ladder companies will not typically be on-scene quickly enough to be assigned primary search duties.

   a. That is acceptable because all firefighters’ skills and abilities can and should be used as appropriate.

   b. IRIT and primary search by any firefighter is not only appropriate, but vital under IDLH conditions.

   c. Even if a ladder company is one of the first units on-scene, assigning the ladder company primary search operations is not always the best use of available resources.

Ladder Company Philosophy

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What is the purpose of the ladder company? Why does it respond and what does it bring to an incident? It is well understood that the mission of the Albuquerque Fire Department is saving lives and protecting property. This responsibility is shared by all units that respond to any incident. Specific to fireground emergencies, multiple companies with varying abilities respond. Many functions must be accomplished to achieve a successful outcome at any fire incident. The operation that saves more lives and protects more property than any other fireground operation is the delivery of water to the seat of the fire. Almost everything else that occurs on the fireground should support the delivery of water. The operations that assist engine companies with the delivery of water are often termed “support functions”. The other responding companies (Rescues, Squads and Ladders) perform these support functions.

In essence, engine operations extinguish fires and ladder operations determine how the fire will be extinguished. Ladders provide the logistical support functions necessary to ensure water reaches the seat of the fire. Stated differently, it is the responsibility of the ladder company to make the building behave and to support the delivery of water needed for fire control. Making the building behave may require forcible entry/exit, ventilation, loss control, utilities control, and lighting. Support for the delivery of water includes many of the same functions plus laddering and aerial stream delivery. Search and rescue is also a ladder function.

The functions listed above are commonly referred to as “ladder functions”. Can a 3-4 person ladder company reasonably perform all of these functions? No. Ladder functions are mandatory for a successful outcome on the fireground, but ladder functions are not exclusive to ladder companies. Ladder functions must be performed by other responding companies. Realistically, fireground needs normally exceed available staffing of the ladder company so resource utilization and prioritization is critical.

Search and rescue is not typically considered an element in building behavior and water delivery operations. If, however, life safety is the primary reason for AFD existence and search and rescue is a ladder function, why do the ladder companies not commit their efforts toward search and rescue before all other functions? Resource utilization is why. Search and rescue is a tactic that all firefighters, regardless of company assignment, can perform. The AFD bread and butter fire is the single-family dwelling. With the arrival of the first unit (typically an engine or rescue), Command is assumed and an Incident Action Plan (IAP) begins. It is standard for AFD to have the first-in engine begin fire attack and search for victims in the area of fire origin. The rescue should assume 1 of 2

roles depending on the situation. OSHA regulations state that if "no known life hazard exists", a 2-out RIT must be established. The only situations in which the 2-in/2-out rule can be broken are a "known life hazard" or a fire in the incipient stage that does not require the use of PPE and can be controlled with a portable extinguisher. When no "known life hazard"exists, the rescue should become the initial 2-out RIT (IRIT). In this situation the rescue officer should assume Command from the fast-attacking engine officer that was the initial IC and establish the 2-out IRIT as required by OSHA. If a "known life hazard" exists, the rescue should begin the primary search; the 2-in/2-out rule no longer is mandated. The reality of AFD is that ladder companies will not typically be on scene quickly enough to be assigned primary search duties. That is acceptable, however, because all firefighters' skills and abilities should be used when appropriate. IRIT and primary search by any firefighter is not only appropriate, but vital under IDLH conditions. Even if a ladder company is one of the first units on scene, would assigning the ladder company primary search operations be the best use of available resources? (That question is answered below Ventilation vs. Search). The initial stages of a single family dwelling fire exemplify how AFD gets ladder functions accomplished; functions are accomplished not just with ladder company personnel, but all firefighters.

The ladder is loaded with equipment that can be deemed either common or unique. By common, it is meant that equipment such as the irons, K- and A-tools, 24' extension ladder, utility rope, etc. can be found on other AFD units. As such, all units are capable of performing common tasks such as conventional and through-the-lock forcible entry, basic laddering, etc. Although typically labeled "ladder functions", common tasks may be performed by all firefighters; our equipment and training make this possible. By unique, it is meant that equipment such as the rabbit tool, K-12, chain saw, cutting torch, NPV fan, thermal imaging camera, CO detectors, etc. are found primarily on ladder companies. Given the special equipment, ladder companies should typically be assigned based on tool-dependent tactics (plus fire location and building construction).

Here is an example. Why is PPV so predominant in AFD? All engines carry a fan and can open the exit points required for PPV operations; the tools and training exist. Even though ventilation and exit opening are "ladder functions", engine companies performing PPV is an example of good resource utilization. When vertical ventilation is required, ladder companies exclusively have the tools required; that is a true "ladder function". Another example is forcible entry. As an engine company initiates fire attack and encounters an inward-swinging, dead-bolted, wooden door in a wooden jamb, the ladder

company should not be needed for forcible entry. The irons (already with the engine crew to be used for search and forcible exit) should make easy work of that door/lock assembly. The presence of overhead doors, excessive iron bars, multiple doors/locks to force, etc. are circumstances that call for equipment carried solely by ladder companies.

The point of all this is: "ladder functions" are the responsibility of all companies and firefighters. All firefighters can carry out functions that make the building behave, support the delivery of water, and save lives. It is the responsibility of the IC to utilize available resources to meet the incident's strategic goals and tactical objectives. Ladder functions oftentimes are necessary well before the arrival of a ladder company. It must always be remembered that the four critical areas where ladder functions must get done are: roof, rear, fire floor and floor above.

It must be understood that the ladder apparatus is an "offensive" tool. The belief that ladders are to be positioned on-scene for "defensive" water delivery operations in case they may be needed is incorrect. The ladder should be positioned for "offensive" operations that include both tool/resource delivery to the front of the structure AND aerial master stream delivery. (Yes, aerial streams can be used in an offensive posture.)

This Ladder Company Operations guideline is designed to better define ladder company operations on the fireground. It begins with dispatch. Single ladder/multiple ladders should be dispatched appropriately. Correct positioning of ladder apparatus based on present and future incident conditions must be established. Discipline from all responding units is a must. Level I staging guidelines state that the first-in engine, ladder and commander proceed to the incident address – all other units stage. This concept promotes 2 key things: units do not freelance/they wait for assignment and units do not congest the scene. Diligent positioning of assigned units involves leaving the front of the structure available to the ladder company. Is this doable? Oftentimes, the ladder is arriving after the first 2 engines have begun attack and established a water supply. The IRIT rescue company is also on scene. Is it reasonable to expect adequate space to remain for the ladder, near the incident once a supply line is established, 3 apparatus are already on-scene, and parked cars line the street? Yes, it is reasonable. Communications is the element that makes it reasonable. Couldn't responding units be advised via radio of the location/direction of the supply and reminded to maintain a clear path for the ladder company?
Once positioned correctly, tactics should be employed to meet the strategy. Details about tactics including search and rescue, ventilation, forcible entry/exit, loss control,

laddering, utilities control and aerial stream operations are included in this guideline. Equipment standardization and organization complete the handbook.

Locating and removing victims is the purpose for conducting search operations. The life hazard profile must be determined and appropriate actions taken when necessary. Ventilation is a function of firefighting second in importance only to the application of water. So, what should the ladder company be assigned?: Ventilation vs. Search

Ventilation is performed with two different reasons in mind. We either vent for fire or vent for life. Venting for fire is a tactic that allows the fire attack team to enter and operate within the structure. This ventilation method must be closely coordinated with the fire attack team so as not to increase fire and smoke spread. Venting for life is performed in a specific area to provide fresh air for breathing and to improve visibility while searching. As soon as a life hazard is recognized, venting for life should immediately begin. It must be understood that this may intensify the fire; the purpose is to draw the fire away from the life hazard, not necessarily vent the structure. The possible increasing of fire spread is acceptable under this condition and such action must be communicated to the IC.

Should we remove the IDLH from the victims or remove the victims from the IDLH? Several fireground factors need to be considered when deciding which tactic to assign the ladder to. These fireground factors include: 1. building size, construction, interior arrangement, effect fire is having on building, 2. fire size, location, stage, direction of travel, 3. occupancy, 4. life hazard.
First example: 1. one-story single-family dwelling, 2. contents fire in the kitchen, 3. residence, 4. high.
1st engine – attack and search of travel path to seat of fire and area of fire origin
2nd engine – water supply and back-up line
1st rescue – IRIT
1st ladder – complete primary search. Why? Because this is a one-story, contents fire in a compartmentalized residential structure with a high life hazard. The engine drivers' can set up PPV and the #3 firefighter/driver from the ladder can outside vent. It is understood that this firefighter is alone, but he is out of the IDLH and is out of the structure; the ventilation exit opening has to be established.
3rd engine – Full RIT
Once "all clear" given with completion of primary search:
1st rescue – secondary search

1st ladder – salvage
Once "under control":
1st ladder and 3rd engine secure utilities and overhaul
Put this fire in a 2-story structure with the fire on the 1st floor and similar operational assignments may be made. People have been removed from the IDLH. Now, put this fire on the 2nd floor of the same structure. With today's building construction, extension into the attic is likely. So, topside/vertical ventilation need should be assessed by the ladder company (with strong communication with Interior Sector). Communications with the Interior is vital. If conditions are little smoke and heat in the occupied space and significant smoke showing from near the roofline, this is an attic/structure fire, not a contents fire. Depending on roof construction (conventional vs. lightweight) it may be unsafe to have any personnel on the roof. The ladder company should be assigned to the roof to determine if roof operations are safe. In deemed unsafe, the fire should be fought by pulling ceiling, directing water into the attic, and using salvage covers. So, resource allocation:
1st engine – attack and search travel path to seat of fire
2nd engine – water supply and protect interior stairwell
1st rescue – IRIT
1st ladder – Roof Sector and VES
3rd engine – RIT
1st rescue – can now complete primary search
1st ladder – secondary search

Third example: Hospice or adult care facility or penal institution.1. large building, semi-compartmented, 2. fire size and smoke production, 3. lots of people that will need assistance exiting, 4. very large life hazard. Is a massive evacuation effort going to save the most lives or will aggressive ventilation save the most lives? (Removing people from IDLH or removing IDLH from people) Given the time required for evacuation, ventilation comes first.

Whether the ladder should ventilate or search first is situation dependent. The ability of our people to perform basic ladder functions, like PPV, give the ladder company the opportunity to search. The best outcome: simultaneous attack, vent and search = optimal life saving and firefighter safety circumstances.

Thermal Imaging Camera

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Purpose

This guideline describes the.specifications and best usage of the Scott Eagle Imager 160 Thermal Imaging Camera currently assigned to all AFD Battalion Commanders, Ladder companies, special operations Squad companies, and the Quality Improvement Officer (Unit 78). It will be available for use at structure fires, multiple victim motor vehicle accidents, or at any incident where the Incident Commander believes the camera to be of assistance.

Guideline

The Thermal Imaging Camera (TIC) is an invaluable tool. It gives firefighters the ability to “see” when visibility may be otherwise obstructed, whether at a fire alarm investigation, exterior size-up, search, ventilation, or loss control operation. While the TIC can assist the user in the fireground decision-making process, it must be regarded as just one element in the process.

Firefighters and officers must not rely completely on the TIC; all fireground factors must be considered when making such decisions. The TIC should not be regarded as a substitute for practiced and proven techniques used to accomplish fireground tactics. Use of the TIC does not preclude firefighters from using walls, hoselines, or ropes as methods for staying oriented within a structure while conducting search operations.

The TIC is simply a piece of equipment that enhances firefighter visual aptitude, and as such, is not a replacement for common sense. Firefighters must always remember that equipment can malfunction and /or fail when least desired.

Operational Guidance

I. TIC applications

A. Use of the TIC during search operations.

1. The primary search.

a. The TIC may be used on the fireground by ladder or rescue crews to assist in searching for victims. Whenever possible the crew assigned to conduct the primary search will utilize the TIC as an adjunct.

b. The search will be conducted using a standard “right” or “left” hand search pattern while maintaining contact with interior walls. Crews assigned to search and rescue activities will do so using the “Buddy System” (minimum two person team).

2. The secondary search.

a. The secondary search group may also utilize the TIC in searches where adequate lighting is not available.

3. Use of the TIC by Rapid Intervention Teams (RIT).

a. The TIC may be assigned to the company officer of a designated RIT to assist in locating lost or trapped firefighters or other victims at an incident.

4. Use of the TIC in search operations at confined space, collapse, and other rescue scenarios.

a. The TIC can assist in locating victims during Heavy Technical Rescue (HTR) operations such as confined space and collapse rescues.

b. The TIC can be utilized night-time operations at motor vehicle accidents where victims may have been ejected from a vehicle or have wandered off from the immediate accident scene.

c. The officer in charge of these types of incidents may contact Dispatch to request a TIC.

B. Use of the TIC in determining fire conditions.

1. The TIC may be used during the initial fire attack to quickly locate the seat of fire and to assess fire conditions.

2. The Safety Officer may use the TIC to monitor changing fire conditions such as rapid fire growth and fire extension or to

evaluate potential for structural collapse, flashover conditions, and backdraft.

a. Structural conditions may also be monitored by gauging the effects of fire involvement on lightweight trusses, floor joists, and rafters.

3. Use of the TIC to observe the thermal balance within a structure can aid in determining the effectiveness of firestreams.

4. The TIC can be used to assess the effectiveness of ventilation efforts.

a. Example: If high heat conditions are present after vertical ventilation is completed, this may indicate the vent hole is blocked.

5. The TIC can be utilized to locate fire or potential hot spots hidden in void spaces behind walls or ceilings, requiring further overhaul and extinguishment.

C. Use of the TIC during fire alarm activations.

1. The TIC can be useful on calls such as fire alarms and other investigative responses to determine if a fire actually exists.

D. Lightning strikes.

1. The TIC can also be useful in locating fire where lightning strikes or similar conduction on metal duct work and pipes has started a smoldering fire.

E. HazMat events.

1. The TIC may be utilized to determine thermal characteristics of liquids as at HazMat incidents, e.g., where heat is generated in closed containers due to chemical mixing.

II. TIC operation

A. TIC technology and limitations.

1. The TIC measures the varying amounts of infrared energy (heat) emitted by objects to create a thermal “image” and project that image onto a screen in the camera.

2. Differences in infrared energy (or heat) are displayed in varying shades of gray. The whiter/brighter the image is, the warmer the object.

3. The TIC is capable of reading temperatures within a range of 0 – 1100^{o} F.

4. The camera operates in two energy bands, a lower and upper band.

   a. The lower energy band functions when temperatures are between 0 – 200^{o} F.

   b. The upper energy band functions for temperatures greater than 200^{o} F.

      i. The activation of the upper energy band is identified on the camera’s viewing screen by the presence of “EI” in the upper left hand corner of the display.

      ii. If the image being viewed appears red in color, the object is 450^{o}F or hotter.

5. Prolonged use of or an extremely hot environment may result in the TIC’s internal components overheating. Under these conditions, a HIGH TEMP warning will be displayed.

6. The TIC is waterproof (to one meter) when the battery compartment is properly closed. The TIC will not provide thermal images underwater.

7. While the camera is designed to withstand temperatures up to 700º Fahrenheit without damage, exposure to high temperatures for

prolonged periods of time may result in degradation or loss of the thermal image.

a. If possible degradation of the thermal image is observed, allow for a “cool down” period until the thermal image is restored to normal.

8. Never point the camera directly at the sun. Damage to the detector may result.

9. Because some surfaces act like mirrors to the system, the TIC will not provide images through glass, water, or shiny objects.

8. The camera is not rated as “Intrinsically Safe” and cannot be used in potentially explosive atmospheres.

B. TIC Functions

1. To turn the camera on, depress the right button located beneath the display screen. (This button is the only operational button on the TIC.)

2. Press the right button at any time to quickly recalibrate the image.

3. Press and hold the right button for a few seconds to place the camera in STAND-BY mode. This mode is indicated by green lights flashing between the two buttons. STAND-BY mode should be used to conserve the battery whenever possible. Return to active mode by depressing the right button for a short period.

4. The camera is turned OFF by depressing the button until the display is no longer present.

C. TIC Use

1. In order to avoid dropping the unit the TIC should be carried using both the side strap-handle and neck strap. The shape of the viewfinder accommodates the shape of the SCBA facepiece.

2. The camera should be used with a slow, deliberate (from left to right, from ceiling to floor, etc.) sweeping motion allowing the viewer

to assess and interpret the thermal images seen through the camera.

3. The use of the camera should augment, but in no way replace, regular search techniques (i.e. contact with walls, contact with crew members, staying low in high heat and smoke conditions, searching with hands and feet outstretched, communications, etc.).

4. The TIC is designed to work up to four hours on a completely charged battery.

   a. An indicator of remaining battery power is displayed in the upper right hand corner of the display.

   b. When the battery is at 20% remaining capacity, LOW BAT will appear in the upper right hand corner.

C. Maintenance

1. Batteries

   a. Batteries should be removed from the TIC and charged either after extended use or after one week without use.

   b. Each TIC should have a battery charger and two batteries.

   c. Both batteries should be kept in the TIC case on the truck, with a full charge, as much as possible.

   d. The battery must be placed in the charger carefully, with the flat sides of the battery lining up with the flat sides of the charger.

   e. The charger has lights that indicate battery status:

      i. RED = battery is charging

      ii. GREEN = charging is complete

      iii. YELLOW = battery is either too hot or too cold for charging.

iv. FLASHING RED = defect in battery; place battery out of service

2. After use on the fireground, the TIC should be wiped down with a damp cloth soaked in water and mild detergent and then dried with a cloth towel.

ALBUQUERQUE FIRE DEPARTMENT
STANDARD OPERATING GUIDELINES

Team Search

SOG 5-3-03

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Under development

Ladder Company Ventilation

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Purpose

The purpose of this guideline is to provide an overview of ventilation advantages and tactics. While ventilation is typically considered a Ladder Company operation, it is routinely performed by other units operating on-scene; because the ladder company may be needed for tasks involving their specialized equipment, or because the ladders often arrive later on scene then other units.

Since all Albuquerque Fire Department engine companies carry positive pressure fans, ventilation efforts can be accomplished by any unit on-scene when ordered and should not be considered the sole responsibility of ladder crews.

Guideline

Ventilation is the process of removing heat, smoke, and fire gases from a building and replacing those products of combustion with fresh air. When employed in conjunction with fire control efforts, ventilation allows crews to make rapid entry into a fire building to save lives, extinguish the fire, and achieve fireground objectives.

Removing products of combustion by ventilation provides better visibility, allowing victims and the seat of the fire to be located more quickly and easily. Ventilation reduces the amount of heat stress that firefighters endure when effecting a search or conducting an interior attack. Ventilation also improves the chances of victim survivability by lowering interior temperatures and introducing fresh air.

Operational Guidance

I. Ventilation size-up considerations

A. Is ventilation necessary?

B. Are there any victims that can be saved?

1. Where are the victims located?

C. How old is the building and what type of construction is it?

D. Where is the fire and how far has it extended?

E. What type of ventilation is required?

F. If considering vertical ventilation, what type is the roof?

II. Natural ventilation versus mechanical ventilation

A. The fire service uses both natural and mechanical ventilation to achieve ventilation.

B. Natural ventilation depends on convection currents, wind, and other natural air movements to allow atmospheric contaminants to flow out of the structure.

1. This method of venting is used when quick ventilation is needed (such as in a rescue situation).

2. Natural ventilation may be limited in effectiveness by wind speed and wind direction.

C. Mechanical ventilation aids natural ventilation by using one of three mechanical means.

1. Positive-pressure ventilation.

a. Positive-pressure ventilation (PPV) is the preferred method of ventilation.

b. PPV uses powerful fans to force fresh air into the structure.

c. PPV can be rapidly deployed by one firefighter.

d. Because every ladder and engine company has them on their apparatus, PPV can be incorporated early into the operational plan.

i. Example: The first-in engine driver can place the positive pressure fan at the attack entrance while firefighters are stretching hose lines.

2. Negative-pressure ventilation.

a. Negative-pressure ventilation requires the use of smoke ejectors which are only carried on ladder trucks.

b. Smoke ejectors draw heat, smoke, and fire gases out of the building - creating a negative pressure which draws fresh air in the building.

c. Negative pressure ventilation has disadvantages.

i. Awkward positioning of equipment.

ii. Requirement of a power source.

iii. Poor air flow control.

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3. Hydraulic pressure ventilation.

a. Hydraulic ventilation requires a hoseline with a broken stream or fog pattern to create a pressure difference in front of and behind the nozzle.

b. The stream should be pointed out a window or door, and can be very effective.

III. Horizontal and vertical ventilation tactics

A. Horizontal ventilation can be accomplished by opening doors and windows to direct air flow (using either natural and mechanical currents).

B. Vertical ventilation usually requires that crews open roofs and floors to allow convection currents to move the smoke and fire gases out of the building.

1. Vertical ventilation efforts can employ the use of PPV, or other mechanical methods, or it can rely on natural air flow (including the chimney effect).

2. Consider using existing roof openings (such as skylights) as alternatives to cutting through roofs.

Roof Operations and Ventilation

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Purpose

Vertical ventilation requires firefighters to operate in a very dangerous area location, above the fire. Extreme caution must be observed at all times. The purpose of this guideline is to identify the responsibilities and objectives of companies assigned to roof operations, and to define safe and effective ventilation practices.

Guideline

Vertical ventilation performed by companies assigned to roof operations is often required to allow the escape of heated air, fire gases, smoke, and other products of combustion. Doing so will allow interior crews to complete fire control and rescue activities. Early ventilation is often critical to the safety of firefighters and to the survivability of fire victims. Effective ventilation reduces the chance of flashover and backdraft hazards.

Operational Guidance

I. Ventilation objectives

A. Vertical ventilation, as close to directly over the fire as possible, is the most effective form of ventilation for fighting interior fires. The objective is to alter interior conditions.

1. If the fire self-vents by burning through the roof, it will generally do so in the best location (directly over the fire).

2. If vent holes are cut in the wrong places, the fire will naturally be channeled to them possibly increasing hazards to interior crews and occupants, and increasing damage and loss.

3. Existing openings such as skylights, roof hatches and doors can be used to accomplish ventilation without cutting the roof.

B. The best operating position to determine if a building requires ventilation and the location and timing of that ventilation is the interior division.

C. Interior and roof forces must communicate via portable radio in order to coordinate the fire control effort effectively.

D. For optimal results, ventilation should be completed before attack hoselines are advanced into the fire structure.

II. Roof safety

A. Roof Sector responsibilities will be assigned to company or chief officers who must be on the roof to supervise crews.

B. Roof Sector crews must enter the roof from an established safe area and must always have a secondary means to escape the roof, or to access safe refuge on an unexposed and structurally sound roof surface.

1. Ladder trucks and ground ladders should be strategically placed to allow safe access to the roof, emergency exit from the roof, and tactical positions that would permit effective defensive operations if needed.

2. Roof ladders shall be used for operations on any roof where slopes present a problem or crews cannot effectively operate aerial ladders or aerial platform appliances.

C. The first personnel reaching the roof must quickly evaluate the degree and extent to which the roof may be damaged.

1. The roof must be confirmed as structurally sound before committing personnel above the fire.

2. Firefighters working on the roof must continually assess the structural integrity of the roof.

a. Attention must be paid to any hazards (such as concentrated loads, including heavy heating or cooling units), especially if fire conditions change or worsen.

3. Time and fire conditions will be constantly working to weaken the roof.

4. Effective roof ventilation will tend to keep roofs intact longer.

5. If ladder crews cannot get on the roof to ventilate because of advanced fire conditions, Command must consider switching to a marginal offensive or to a defensive strategy.

    a. It is always better to abandon the building a bit too soon rather than a bit too late.

D. The Roof Sector will be responsible for obtaining its own protective hose line as needed.

1. Roof lines will be operated only for the purpose of protecting personnel and external exposures, unless Command orders a coordinated roof attack.

E. Hoselines (especially aerial or master streams) should not be operated into ventilation holes.

F. All Roof Sector personnel should wear full (PPE) protective clothing and SCBA (with facepiece) when operating above a fire.

G. Minimal tools to bring to the roof include the following:

1. Pick axe.

2. Pike pole.

3. Radio

4. Saws with the proper blade for the job.

H. The Roof Sector must monitor the radio at all times.

1. Radio contact must be monitored over the noise of saws.

2. When providing using portable radios during high noise operations, the radio should be shielded from the noise, by mass or space.

    a. Minimize background noise by stepping a short distance away, only if it is safe to do so to.

I. All crewmembers operating on-scene should be aware of wind direction and should communicate any observations of changes to the Roof Sector.

III. Roof operations

A. Command should establish a Roof Sector during offensive fire operations to evaluate roof conditions and to complete roof ventilation.

B. The initial Roof Sector Officer must report to Command the following conditions:

1. Roof design and construction (such as flat, peaked, bowstring, or other).

2. Structural conditions.

3. Fire conditions or effects of the fire on the roof's integrity.

4. Locations of fire walls.

5. Locations of heavy objects that are affected by fire conditions.

6. A ventilation plan.

C. Roof Sector operations include specific actions.

1. Determining a safe working surface.

2. Cutting adequate size ventilation hole(s) and achieving effective ventilation.

a. A rule of thumb to consider is to make ventilation hole(s) of at least 10% (of the total roof surface) over the involved area.

b. In some cases, more than one hole will be required.

i. Crews must move from the first hole towards safer areas with each consecutive ventilation hole.

ii Additional holes consume time and crews must constantly evaluate the structural stability with changing conditions over time.

3. Coordinating roof ventilation with positive pressure ventilation.

a. The Roof Sector must advise Command when ventilation holes are completed and the effect that ventilation has on the fire.

b. Command must closely coordinate positive pressure ventilation when it is being used in conjunction with roof ventilation.

c. Positive pressure should not be utilized until an exhaust exit can be established on the fire floor (horizontal) or until roof ventilation is completed.

5. Coordinating roof fire control operations as directed by Command.

6. Maintaining roof-top monitoring of roof structure and fire conditions.

7. Getting off of the roof, as soon as possible, after ventilation objectives have been accomplished.

ALBUQUERQUE FIRE DEPARTMENT
STANDARD OPERATING GUIDELINES

Power Saws

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

This purpose of this guideline is to define safe and appropriate usage of power saws

Guideline

The adverse operational conditions during which power saws are used during emergencies creates a high potential for accidents. A slight miscalculation or sudden unplanned move can result in a serious accident. Performance, skill, common sense, and strict observation of safety measures can prevent accidents.

It is the responsibility of all personnel to learn and understand these safety guidelines. It is the responsibility of all command and company officers to ensure that their subordinate personnel observe these guidelines whenever power saws are operated in training or at an emergency scene.

Operational Guidance

I. Personal protection

A. Full protective clothing, including proper eye protection, shall be worn by those members operating, and in close proximity to, the operation of power saws.

B. To prevent accidents that may be caused by moving belts, gears, chains, or blades, it is imperative that the saw operator and the guide both have their protective clothing completely buttoned up.

II. Operational considerations

A. Always carry the chain saw with the engine stopped, the guide bar and saw chain to the rear, and the muffler away from your body.

B. Always keep both hands on the control handles when operating the saw. Use a firm grip with thumbs and fingers encircling the saw handles.

C. Make sure that you have secure footing before operating the saw.

D. A team of two firefighters shall always perform cutting operations. The firefighter operating the saw (operator) shall be assisted and/or guided by a second firefighter (guide).

E. The saw shall always be shut off when unattended.

1. The saw shall be shut off while it is hoisted.

F. Have a plan of action before putting the saw into operation. The plan should include:

1. Location and sequence of cuts and openings needed.

2. Consideration of wind direction, products of combustion, reduced visibility, and force on the saw operator, or on any exposures.

3. Provision for at least two means of egress, if possible.

III. Tactical considerations

A. Whenever possible, an officer should be present to supervise cutting operations and to maintain safety precautions by acting as a “guiding firefighter” for the firefighter operating the saw.

1. The number of personnel (involved in cutting operations) should be limited to the minimal number required to sustain the operation.

2. All other personnel shall be removed to a safe location until the operation is complete or assistance with the operation is needed.

B. Before operating the saw, always place the safety guard in the correct position to provide proper protection for the person using the saw.

C. The “guiding firefighter” should maintain hand contact with the back of the saw operator, and tap once to halt the operation if a problem should occur.

D. Once a cut is made, the operator should stop the blade rotation on the material prior to lifting the unit.

E. The “guiding firefighter” should monitor roof conditions and be aware of position on the roof so as not risk safety by working too close to roof edge.

F. Power saw operations are safest when cutting on horizontal surfaces near ground level, or on vertical surfaces near waist level.

G. Operating a power saw above chest height is extremely hazardous and should not be attempted as a normal course of action.

1. This type of operation shall be conducted only under the direct order and/or under the supervision of an officer.

2. The officer ordering this operation shall weigh heavily the value gained against the extreme hazard to personnel.

H. The use of a power saw from a ladder is not recommended if there are other alternatives.

I. Do not operate power saws in suspected flammable or explosive atmospheres.

ALBUQUERQUE FIRE DEPARTMENT
STANDARD OPERATING GUIDELINES

Rabbit Tool

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Features

- The Rabbit Tool is a hydraulic spreader that is intended for use on inward swinging doors that are set in rabbeted jambs. The stronger the door, the more useful the tool becomes.
- The Rabbit Tool does not work well on outward swinging doors or hollow core wooden doors set in stop jambs.
- It provides the ability to rapidly force multiple doors with minimal effort.
- It is best forcible entry tool option under limited or no visibility environments.
- A Rabbit Tool will be carried on all Ladder apparatus and Squad 2.
- Multi-family dwellings, commercial office occupancies, and highrises are buildings in which the Rabbit Tool should accompany the units assigned to the interior. The doors in these occupancies are inward swinging, are set in metal rabbeted jambs, and may have extra locks/security measures – the ideal door/jamb/lock assemblies for the Rabbit Tool.

Operations

- Full PPE with eye protection needed
- Push quick connects together
- Rotate coupling ¼-½ turn to lock connection
- Place jaws between door and jamb – may need irons to create initial purchase point
- Turn release valve toward hose
- Operate pump until door is forced
- Turn release valve toward pump and jaws retract automatically

Care and Maintenance

- Use only Hurst Phosphate-Ester hydraulic fluid
- Fluid should be checked after every 10 hours of use
- Wipe clean after use
- If not working properly or other use issue arises, see Troubleshooting section of Instructions

Positive Pressure Ventilation

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

This purpose of this guideline is to identify the tactical use of positive pressure ventilation during structural fire operations. It also defines other techniques for use of ventilation equipment.

Guideline

Companies are equipped with high volume positive pressure fans. Since most offensive fire operations qualify for early application of positive pressure ventilation (PPV), Command should order PPV, where appropriate, early in the operation. Ladder companies should expect to apply PPV, and crews should dismount their apparatus planning to take fans to the fire scene.

Operational Guidance

I. PPV benefits

A. Positive pressure ventilation has many benefits to fire operations.

B. Among these benefits are the following:

1. Rapid removal of heat and smoke from the building.

    a. Leads to a reduction of the fire's ability to propagate and advance.

2. Improvement in tenability of the fire building's atmosphere.

    a. Increases the likelihood of patient survival.

3. Rapid removal of smoke.

    a. Improves firefighters' ability to conduct search and rescue operations and effective loss control operations.

4. Improvement of atmosphere and visibility.

    a. Leads to increased ability of firefighters to conduct attack and extinguishment operations.

5. Improvement of atmosphere leading to a reduction of firefighter heat stress.

6. Reduction of loss caused by smoke and fire damage to the structure.

7. Reduction of the need for and risk of roof ventilation at many fires.

II. Fan placement

A. Positive pressure fans should be placed at the point(s) of entry, on the unburned side of the fire building, 12 to 15 feet back from the opening (to create a pressure seal of air current around the door).

B. Fan placement should not obstruct any access or egress.

C. Where additional fans are required, placing two or more fans in “tandem” at separate entrances is more effective than in “relay,” or one behind the other.

III. Tactical considerations

A. Positive pressure ventilation is effective only when applied properly.

B. Three major elements are required for effective ventilation.

1. “Exits” for the pressurized air must be provided and must be located in the fire area.

   a. These are generally windows, doors or other openings.

   b. Larger openings are preferable.

2. Positive pressure ventilation must be injected from the unburned side of the fire.

3. PPV must be closely coordinated with the Interior/Attack Sector.

C. It will be the ventilation group officer's responsibility to ensure that these three requirements are completed prior to injecting positive pressure into the structure.

IV. Controlling air flow

A. PPV air flow must be controlled throughout the operation. Too many openings or exit points may reduce the effectiveness of PPV.

1. In some cases, windows and doors that are already open may need to be closed to direct the air flow into the fire area, or the most densely affected smoke area.

B. As one area is cleared of smoke, that area may need to be sealed off and another exit created (in another area of the structure) to direct the air flow into the next area needing to be cleared.

1. Coordination of this work is essential.

2. Ladder company officers or Ventilation Group officers will be responsible for coordinating this effort.

V. Attic fires

A. Attic fires are especially vulnerable to pressure and ventilation factors.

B. Isolated attic fires can benefit from PPV.

1. During the initial attack, fire crews should use small openings in the ceiling for water application.

a. This will prevent the clear environment below the ceiling from rapidly filling with smoke.

2. Moving from one room to another and "punching" the nozzle through the ceiling and using a fog application is very effective.

3. The use of penetrating nozzles is also recommended.

a. Loss control measures should be initiated simultaneously with a fire attack.

4. An “exit” for PPV in the attic must be in place. Most roofs or attics have pre-existing vents, typically at the end of the attic space in a vertical wall. These are often adequate for a ventilation “exit.”

5. Some structures may have a “sealed” attic space with no in-place vent openings. In this case, opening a vertical wall on one end of the attic or cutting a vent hole in the roof may be required.

   a. If pre-existing vents are too small, they may need to be enlarged. Once PPV is in place, large sections of the ceiling can be pulled.

   b. PPV will keep the environment below the ceiling clear. Salvage covers or black plastic should be applied first before ceiling is pulled.

6. In occupancies with a common attic space, PPV must be used with caution.

   a. If used improperly it is possible to spread the fire.

   b. Consider vertical ventilation in conjunction with PPV.

VI. PPV use at multi-story or highrise events

A. Greater coordination and additional fans are required when utilizing positive pressure ventilation tactics at multi-story or highrise fires.

1. Stairwells should be used to direct air flow from PPV. A stairwell should be selected specifically for such use.

2. An air flow exit, in the fire area (such as a window), should be selected as a first choice.

a. In some situations, a stairwell on the opposite side of the fire area can be used.

b. An exit for the exhaust must be obtained; roof doors are appropriate.

3. Multiple fans may be required. Two or more fans may be needed at the base of the building.

a. Additional fans may be needed on landings at various levels in the stairwell.

b. A fan will be needed at the entry to the fire floor.

4. Positive pressure ventilation in multi-story and highrise structures is complex.

a. A Ventilation Group should be established to coordinate all aspects of PPV on all floors.

VII. Use of PPV for exposure control

A. In some cases, PPV can be used for exposure control. This is most effective with common attics (such as strip malls or apartment complexes) or where separating walls may have been breached (as with plumbing penetrations or cracks).

B. The objective is to introduce PPV ahead of a moving fire and force it back into the fire area. An exit point (for products of combustion) in the fire area is needed in most cases.

1. For exposure control, the fans(s) would be placed at an entry point in the most severe exposure first.

2. If a heavy smoke condition exists, it may be beneficial to create a temporary opening (such as a door) to allow an exit for the pressure and smoke.

3. Once the smoke has cleared, the exit should be closed, with the building sealed, so that it will “over pressurize” the exposure.

a. An opening in the ceiling will be required to pressurize the attic area.

b. Over-pressurized air will force hot gases back across the breaches, or back down common attic spaces towards the fire area.

c. This can prevent fire spread extension.

4. The second most critical exposure would then receive PPV in a similar manner.

a. The next priority would be the fire occupancy.

VIII. Use of PPV in large buildings

A. Buildings with areas of large square footage may require multiple fans, perhaps at more than one location to effectively remove smoke.

1. These situations are more complex and require close coordination of PPV with all sector officers.

B. Command should consider a Ventilation Group to coordinate all ventilation operations in large buildings.

IX. Precautions

A. Positive pressure ventilation can create problems if not effectively managed, monitored, and coordinated.

B. Be aware of the problems listed below and take appropriate precautions.

1. An exit (for the flow of heated air, gases and products of combustion) must be available in the burned area, or the fire may be pushed into the unburned portion of the fire structure.

2. Because of positive pressure, a “blow torch” effect of fire blowing far out of the exit may occur.

   a. This fire behavior is normal and predictable; adjacent exposures may need protection.

3. Do not direct a fire stream into an operating PPV exit point.

4. All concealed spaces need to be checked for fire extension.

5. Ladder company officers and/or Division/Group officers will be responsible for monitoring and coordinating the application of PPV.

6. Gas-powered fans produce carbon monoxide, so breathing apparatus may be required when PPV is used during overhaul operations.

Forcible Entry

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

This guideline addresses the tactical objective of forcible entry into a building during a structure fire. In particular, it identifies the role of Ladder Companies. Since forcible entry is a basic firefighting function, conventional forcible entry techniques and the associated tools are considered to be implied knowledge and will be referred to but not reviewed within this guideline.

Guideline

All fire companies and all firefighters are capable of performing forcible entry. This guideline addresses forcible entry issues from the Ladder Company perspective, as performed during a structural fire emergency.

It is understood that the primary objective of ALL firefighters, above any other tactical or strategic consideration, is the preservation of human life. In order to insure an organized firefighting effort, specific companies are assigned individual tasks that define that company's strategic and tactical role while operating on-scene. The responsibility for forcible entry has been directed to Ladder Companies.

Operational Guidance

I. Entry guidelines

A. When a structural fire progresses past the incipient stage, the fire area will be considered an IDLH atmosphere.

B. Every member entering the IDLH must be equipped with their full complement of PPE, SCBA, portable radio, flashlight, and some type of hand tool.

C. No one will enter an IDLH atmosphere unless that member teams up with at least one other member and remains within voice or visual contact with that member.

D. Additionally, there will be at least two firefighters outside the IDLH assigned as IRIT.

E. If a known life hazard is discovered, and immediate action can prevent the loss of life, rescue actions may be initiated by an individual member - without waiting for an IRIT.

1. If such action is undertaken by the individual member, the Incident Commander must be made aware of such activity.

2. This applies ONLY for an Urgent Rescue Profile, such as a known life hazard, and not for standard Search and Rescue activity during Medium and Low Rescue Profiles.

II. Forcible entry

A. Forcible entry is a descriptive job term commonly used by firefighters to include a number of tactics and techniques.

B. For the purposes of this guideline, the working definition is as follows:

1. The methods used by firefighters to gain access to an area or structure when the entrance is either locked, blocked, or not provided.

C. It should be understood that performing forcible entry will result in damage to the structure being entered, regardless of the tools or techniques employed.

1. The acceptable or justifiable damage resulting from forcible entry depends on the situation, as well as the tools and techniques employed.

III. Reasonable expectations during forcible entry

A. All companies, and all crewmembers have the requisite capability to perform forcible entry during a routine structural fire event.

1. It is reasonable to assume that any company can provide forcible entry for themselves as needed.

2. This will free up the resources of Ladder Companies, freeing them to be used where they will have the greatest impact on the fire scene.

IV. Required forcible entry by a Ladder Company

A. The Ladder Company will be required to perform forcible entry on the fireground under specific circumstances.

1. When more than one occupancy door must be forced, such as at multiple apartments.

2. Whenever access is complicated by burglar bars.

3. When the forcible entry problem is complicated by unusual and/or difficult locks.

4. When the forcible entry problem is complicated by an unusual door, such as rolldown doors, scissor gates, or commercial occupancy rear doors.

5. Whenever forcible entry requires the use of specialized tools, such as a rabbit tool, duckbill lock breaker, or saw.

6. When the Ladder Company is performing forcible entry in order to carry out another tactical assignment, such as Search and Rescue

7. Whenever Engine Company members are delayed and/or preoccupied with other tactical assignments.

B. The Incident Commander should not hesitate to call for additional Ladder Companies as may be required by operational needs.

V. Forcible entry location considerations

A. In choosing the location to perform forcible entry, overall strategic considerations should be evaluated.

B. The first choice, and best location, for any company to perform forcible entry should be the front/main door to the occupancy.

C. Entry should be performed to accomplish specific goals.

1. Provide Search and Rescue companies with the highest probability of locating a trapped or overcome victim in need of rescue.

a. The immediate area of the occupancy's front entry is where most fire victims will be found.

2. Create easier conditions for the suppression advance.

3. Make it easier, safer, and faster for all operating firefighters to enter the occupancy.

4. Create a safer and orderly escape route if interior fire conditions worsen.

C. Using windows or a garage door as the primary entry/exit point creates a series of dangers for firefighters and is discouraged.

D. If the occupancy has a rear door, it should be opened - and forced open if necessary - to create a secondary escape route for interior operating companies.

1. The most efficient vantage point from which to force these doors is from the exterior.

VI. Basic principles of forcing entry

A. Try before you pry.

B. Force the door the occupant is most likely to use.

C. Maintain the integrity of the door.

D. Don’t ignore the obvious.

1. It is often easier to knock out a small pane of glass (to reach in to

unlock a door) than to destroy an entire door.

VII. Special considerations

A. In the case of multiple doors, hydraulic tools (such as rabbit tools) should be used to improve the speed of the forcible entry team and reduce the fatigue factor of the operating firefighters.

B. Doors covered with an external iron security door, commonly referred to as burglar bars, can be forced using conventional methods

C. If crews are faced with the task of forcing entry or providing means of egress through burglar bar-equipped windows, conventional forcible entry tools can be used to shear the lag bolts or bolt heads securing the bars to the window or wall.

1. These lag bolts have good compressive strength but lack shear strength and can be attacked to exploit this weakness.

2. Although windows should not be the first option as an entry point into a fire building, windows routinely need to be prepared as an alternate entry/exit

D. While garage or rolldown doors should not be the first option as an entry point, they routinely need to be prepared as an alternate entry or exit. In very rare circumstances garage/rolldown doors will need to be used as a primary entrance.

1. Forcing a garage or rolldown door is problematic using conventional tools and techniques.

a. When viewing these types of doors from the exterior, there is no reliable way for firefighters to know if these doors are mechanically operated or manually operated.

b. These types of door may provide an opening which can compromise firefighter safety if they are not secured against accidental closing.

c. In the event that garage or rolldown doors are already open (or are forced using conventional methods) every effort

should be made to ensure that these doors remain in the open position. This can be achieved by:

i. Placing a hook in the guide rails.

ii. Clamping a vice grip plier on the guide rails.

iii. Using a tool such as a halligan bar to bend the guide rails so that the door will not be able to traverse the rails, remaining open.

2. A circular saw is the best tool for performing forcible entry through garage or rolldown doors.

a. An opening cut into the door eliminates the possibility of accidentally closing and trapping firefighters inside.

b. Forcible entry is achieved by making a diagonal cut from highest reachable middle point of the door one of the lower corners.

c. A second cut is made from the same point to the other lower corner, making an inverted “V” in the door.

d. The cut must include any channel rail that may be present at the bottom of the overhead door.

e. Once the “V” is complete, Ladder personnel should enter the structure and assess whether opening the adjacent swinging door or enlarging the “V” cut into a large rectangular opening is more appropriate to accomplishing operational goals.

E. Scissor/security gates are typically found on the front of stores and high traffic commercial occupancy areas such as inside a shopping mall.

1. These gates can be either manually or mechanically operated.

2. Many of these gates have a hidden bypass method for operating the gate.

a. Locating the hidden bypass control may not be easy while operating under emergency conditions.

b. Do not waste time locating the bypass control.

3. Scissor/security gates use a variety of locking mechanisms, including padlocks to secure the gate.

4. The most efficient method for circumventing a scissor/security gate is by using a circular saw to cut the gate, lock, or both.

a. The lock should be the first choice.

b. When the lock cannot be accessed to force or cut, then the entire gate should be approached with the same techniques utilized with a rolldown door.

F. Padlocks are used to lock a variety of doors and gates and can be found in numerous combinations and types.

1. Padlocks can be forced with a variety of tools including those illustrated below:

a. Duck bill lock breaker.

b. Halligan bar.

c. Circular saw.

d. Boltcutters.

e. Cutting torch.

2. Picking a padlock is not recommended.

   a. It is a specialize skill and requires a significant amount of time to perform.

   b. The tools required for the performance are not found on a Ladder Company.

G. The front doors of commercial occupancies are often 90% glass. Despite the significant amount of glass, they doors should be forced using the through-the-lock method whenever possible.

1. Through-the-lock forcible entry is the fastest and most professional approach to negotiating this particular forcible entry situation.

   a. The glass on these doors is tempered security glass and very difficult to break and/or cut.

b. Breaking glass also removes the ability to control air movement through the entry opening.

c. Commercial occupancy doors usually have unusually large throw/deadbolts which are very time and labor intensive to force using conventional methods.

H. Even though it is often time-consuming, the rear doors of a commercial occupancy will typically respond to conventional forcible entry methods.

1. Factors that affecting the speed of forcing entry into commercial occupancies are detailed as follows:

a. The experience of the firefighters.

b. The type and number of locks used on the door.

c. Access to the door.

2. Specific actions should be taken in gaining access into the rear of a commercial occupancy:

a. Hydraulic tools should be used to force the rear door, whenever possible.

b. The use of a circular saw or torch may be considered.

c. A wall breach may be the best alternative.

Ground Ladders

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

Ground ladders allow for a variety of operational capabilities, such as providing access to rescue routes, escape routes, and ventilation points. This guideline provides the Albuquerque Fire Department's approach to the deployment and use of ground ladders.

Guideline

Ground ladder placement can facilitate fireground operations including rescue, access to upper floors/roof, ventilation, emergency egress, and above ground-level hoselines.

Ground ladder operations should begin with proper ladder selection. AFD uses the 10' attic, 14' and 16' roof, 14' extension, 24' extension, and two-section and three-section 35' extension ladders. All personnel must know the capabilities and limitations of ground ladders used on the fireground.

Operational Guidance

I. Ladder specifications and applications

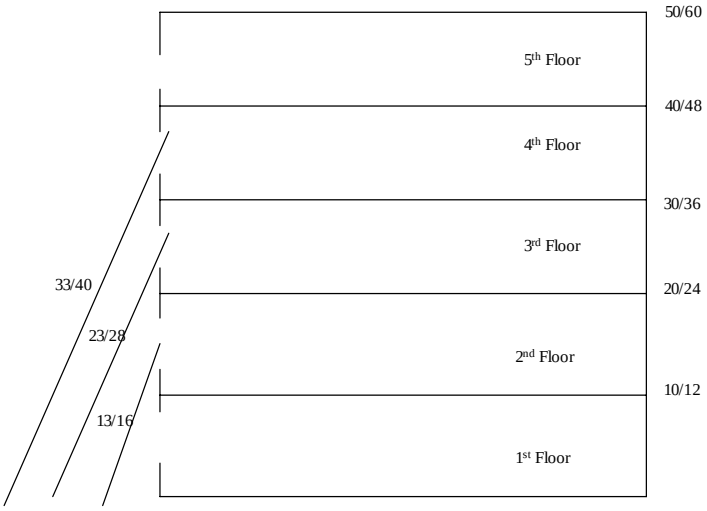
A. Ground ladder applications are detailed in Table 1.

Table 1

Ladder type	Applications
10' attic	Access to attics in interior of residential structures
14' extension	Interior use
14' roof 16' roof	Access to first-story residential roof. Access to second-story residential window. Used on roof for weight distribution and footing.
24' extension	Access to third floor windowsill and lower on residences. Access to second floor window and lower on commercial structures.
35' extension	Access to fourth floor windowsill and lower on residences. Access to third floor window and lower on commercial structures.

B. Figure 1 illustrates typical ground ladder applications.

Figure 1.



C. When in doubt, use a longer ladder than you think you will need.

D. The bedded length of all ground ladders should be indicated at the butt end of the ladder, next to the total ladder length sticker.

E. Table 2 details ladder types and the bedded length of those ladders.

Table 2	
Ladder type	Bedded length
24' extension	14'
2-section 35' extension	20'
3-section 35' extension	15'

II. Climbing angle and proper tip placement

A. The proper climbing angle for most ground ladder operations is approximately 70 degrees.

1. One exception to the 70 degree rule is when positioning the ground ladder at a windowsill for rescue or as a means for rapid escape.

2. When positioning for rescue or rapid escape, the ladder should be positioned at about a 60 degree angle to achieve a more comfortable, stable position for firefighters to work and rapidly deploy from a window.

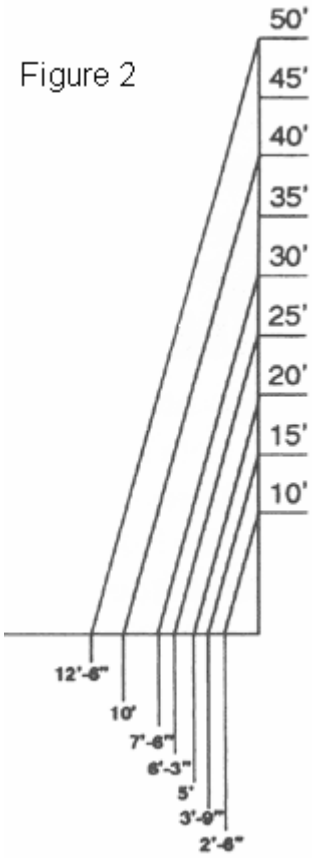
B. Climbing guidelines.

1. A critical component ladder safety is the correct placement angle of ground ladders.

2. A simple formula for correct ladder placement is to position the bottom of the ladder at a distance from a vertical plane equal to 1/4 the total working length of the ladder.

3. Figure 2 illustrates a method for the proper placement of ladders of varying lengths.

Figure 2



3. Using this method, the ladder is placed against the vertical plane (such as a wall) at a 75-1/2 degree angle.

C. Proper tip placement parameters include the following:

1. For rescue or firefighter access, place the tip of the ladder below the windowsill.

2. For breaking glass or ventilation, position the tip of ladder at the top of window on the windward side.

3. For roof access, position the ladder with a minimum of five rungs extending above the edge of the roof.

a. This will facilitate getting off and on the ladder, and make locating the ladder easier if conditions change and firefighters need to get off the roof quickly.

b. Parapet height may require a second ladder to provide access over the parapet and onto the roof.

III. Safety guidelines

A. All ground ladders should be secured in place before climbing.

B. Keep all ground ladders away from electrical lines.

C. Always set up two ladders to provide access to/exit from the roof, preferably at opposite ends of the structure.

D. Ladders to the roof should be placed away from the section of the roof that is being ventilated, in order to create a strong platform for use in walking to the venting location.

E. Ladder the strongest areas of the structure, specifically, at the corners.

1. Corners are structurally strong.

2. If ladders are positioned at the corners of the building, a disoriented firefighter on the roof can go to a corner with a 50% chance of finding a ladder.

F. Ladder the windward side of the proposed vent area.

G. Avoid setting up ground ladders directly in front of entry/exit routes or where fire is likely to vent.

H. Consider that fire service ladders are assumed to be able to safely support a 750-pound working load with a 4:1 safety factor.

IV. Click method

A. The click method is a guide for having the tip of an extension ladder reach its objective the first time it is raised.

1. Rarely, on the fireground, is there sufficient time to extend the ladder, place the tip, assess the tip position as unworkable, bring the tip away from the building, raise the ladder to the appropriate tip height and place the tip against the building again.

B. The click method refers to the “click” that the fly section makes as the locks pass over a rung when the fly is extended.

1. Each “click” is equal to 14” of vertical travel.

2. To ensure that the ladder is extended the correct length for proper tip placement the first time, the following quick calculation can utilized:

a. Determine the target height (at the location where the tip makes contact with the building).

b. Subtract the bedded length of the ladder being used from the target height. This number equals the number of "clicks."

i. If the target is above the second-floor, subtract one “click”. This is due to the fact that the ladder travels 14 inches per “click”, not 12 inches.

ii. If a three-section 35-foot ladder is used, the fly section travels twice as far with each “click”. So, divide the number of “clicks” by two, then subtract the one “click” for being above the second-floor.

V. Inspection and maintenance

A. Ground ladder Inspection.

1. According to NFPA 1932, all ground ladders are to be tested at least annually.

2. Ground ladders should be inspected for damage after each use.

3. Ground ladders should be inspected for damage quarterly.

B. A complete visual inspection should include the following parameters:

1. The base section.

   a. Side rail condition, rail alignment, rung condition, rung to rail attachment, butt spurs/foot pads, ladder stops, stay poles, toggles, rail guides/lubrication.

2. The second section.

   a. Side rail condition, rail alignment, rung condition, rung to rail attachment, ladder stops, pawl operation and lubrication, rail guides/lubrication.

3. The third section.

   a. Side rail condition, rail alignment rung condition, rung to rail attachment, ladder stops, pawl operation and lubrication, rail guides/lubrication.

4. The fly section.

   a. Side rail condition, raid alignment, rung condition, rung to rail attachment, ladder stops, pawl operation and lubrication, rail guides/lubrication.

5. Halyard condition.

   a. Rope size and condition, anchors, thimbles, clamps, pulleys, and adjustment.

6. Roof hooks.

   a. Hook size, hook condition, operation and sharpness, hook housing and adjustment.

7. General issues.

a. Heat sensor labels., NFPA 1931 certification, electrical hazard stickers, serial number identification, and ladder length marking within 12 inches of the butt.

b. Heat sensors are labels with a heat indicator. If the heat sensor in the label turns black, the ladder should be removed from service.

i. Figure 2 illustrates a ladder heat sensor.

Figure 2.

C. Ground ladder testing.

1. Ground ladders should be tested if any of the following conditions occur:

a. If they are suspected of being unsafe.

b. If the ladder has been subjected to overloading.

c. If the ladder has been subjected to impact loading or unusual conditions of use.

d. After any heat exposure.

e. After any deficiencies have been repaired, unless the only repair was replacing the halyard.

f. Before the ladder is placed in-service for the first time

D. Ground ladder maintenance.

1. Clean and well-maintained ladders last longer.

a. General maintenance for ladders is a simple process of taking time to visually inspect all the parts: beams, fasteners, and rungs for damage or wear.

b. Candle wax or paraffin wax should be applied to all contacting surfaces.

i. Properly lubricated ladder sections slide easily and work better.

2. If in doubt of the condition or quality of any ladder halyard, always replace It.

a. AFD Logistics should be contacted to have any ladder rope replaced.

b. Standard ground ladder pulleys accommodate 3/8" - 1/2" diameter ropes.

3. Heat sensor labels are made of heat-sensitive material that turns black in temperatures higher than approximately 300 degrees F.

a. Once aluminum fire ladder materials reach this 300 degree F temperature (even if only for a moment), the ladder material may have lost at least 25% of its load capacity.

b. This heat exposure effect is not reversible in the ladder and can continue to accumulate over time.

c. Any ground ladder with a blackened heat sensor label should be removed from service at once and that ladder should be load-tested before being put back into service.

Loss Control

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

Loss control is primarily a ladder company function; however. as with other fireground operations, it may also be performed by any AFD unit operating on the fireground. This guideline defines approaches for minimizing damage and maximizing the remaining value of the owner's property while ensuring firefighter safety.

Guideline

Loss control tactics are performed in an effort to minimize property damage resulting from either fire or firefighting operations. Salvage and overhaul operations are both considered elements of loss control. Firefighters must keep in mind that fire events are an uncommon experience for most people.

Members of the public, along with their property, must be treated with the utmost respect. AFD crews must do whatever possible to minimize the effects of fire-related losses. Loss control is not glamorous work; however, there are few better opportunities for AFD to demonstrate a high level of commitment and professionalism than through loss control activities.

Operational Guidance

I. Overhaul

A. Overhaul consists of any action taken to expose hidden fire and ensure its extinguishment.

B. Overhaul should begin as soon as all visible fire is extinguished.

C. An overhaul operational plan should be based on specific criteria.

1. Fire location.

2. Fire intensity.

3. Fire extent.

4. Type of building construction.

5. Type, amount and distribution of contents.

D. Firefighters assigned to overhaul operations must constantly be aware of the damage being done to the structure when overhauling.

1. Damage during overhaul is necessary, but needs to be justifiable. Unnecessary damage is not acceptable.

E. Techniques and considerations utilized in assessing possible fire extension and need for overhaul.

1. All firefighters have felt warm walls at structure fires. To best determine the location of fire extension in walls, firefighters should LOOK, LISTEN, AND FEEL prior to breaching the walls.

   a. LOOK at the fire's area of origin, follow the fire behavior, and consider the likely fire spread based on the building's construction.

   b. LISTEN for the popping and snapping sounds of burning wood.

   c. FEEL every location that was exposed to heat.

   d. Breach walls appropriately.

2. Firefighters should use the "15-Second / 2-Minute Rule" to determine whether a wall that is warm to the touch needs opening.

   a. It may be holding residual heat and may cool on its own.

   b. Place the back of an ungloved hand on the wall. If the hand cannot be kept against the wall for at least 15 seconds, open the wall.

   c. If the hand can be left in place for 15 seconds but is still warm, return to the same spot two minutes later. If still warm and the crew's instincts are to open it, open it.

3. Any sheetrock-sheathed wall that has any smoke or heat damage has no remaining value and will be torn down and replaced once reconstruction of the property begins. When in doubt, open it.

4. The thermal imaging camera is a useful tool to locate hot spots and determining when and where to open walls and ceilings.

5. Specific locations in a structure which should always be considered for hidden fire extension.

   a. Areas around man-made openings such as electrical outlets, switches, and pipe chases.

   b. Window and door frames.

   c. All shafts and vertical voids.

   d. All horizontal voids such as attic/cockloft and truss floor systems.

6. If potential for spread to the floor above exists, first remove baseboards on the floor above the fire to determine if more wall opening is needed.

7. If charring is present, open in all directions moving outwards from the charred area until charring is no longer present.

F. Tools utilized in overhaul operations include the following:

1. Axes.

2. Bars.

3. Pike poles.

4. Thermal imaging camera.

5. Scoop shovels.

6. Salvage covers.

7. A charged line should be considered mandatory.

G. Most fireground injuries occur during overhaul. Firefighter safety provisions which must be observed during overhaul operations include the following:

1. Structural stability must be assessed prior to overhaul beginning, and must continue throughout the entire overhaul operation.

2. All utilities must be secured prior to beginning overhaul operations.

3. Full PPE and SCBA must be worn.

a. Incomplete combustion and accompanying CO production are at their height during overhaul operations.

4. Continued use of PPV to help maintain visibility and removal of residual heat and smoke.

a. It must be remembered, however, that overhaul is the search for remaining HIDDEN fire.

b. If the extent of fire spread and exact fire location is not known, PPV must not be initiated.

H. Overhaul operations may be supervised by an arson investigator. In this case, priorities include preserving the scene and any evidence for subsequent investigation.

1. Do not move possible evidence, such as containers or accelerants.

II. Salvage

A. Salvage operations consist of efforts aimed to minimize damage from fire, smoke, heat, water, and weather.

B. Salvage operations are undertaken with the purpose of protecting the contents of the structure.

C. Salvage should begin early and continue throughout the firefighting operations.

D. Two basic concepts for property protection exist:

1. Collect and cover.

a. Contents should be gathered and covered for protection.

2. Remove.

a. Contents should be removed from the interior or to another location, if feasible.

E. Some amount of water damage is inevitable when fighting fire, but excessive water damage should and can be avoided.

1. It is incumbent upon company officers to assess the need for early salvage operations.

2. The following example illustrates the need for salvage duties to be initiated PRIOR to the fire being determined "Under Control."

a. If the fire is in the attic space, aggressive fire attack operations are required and it is understood that much of the ceiling will need to be removed.

b. If the IC receives communication that the fire is above the attack team, the IC can coordinate and dedicate resources to salvage operations.

c. Once the Ladder has completed the Roof Sector priorities and the Rescue has completed the primary search, these units could be reassigned to salvage duties.

F. Once the fire is “Under Control,” salvage operations need to continue.

G. Overhaul should not create needless loss to property.

1. Salvage cover placement not only protects remaining property of value, it may also serve as a means to protect the area of fire origin for pending fire investigation.

H. Salvage operations must be given high priority when faced with large and multi-story structures.

1. The contents of many large commercial occupancies may be of more total value than the structure itself.

2. The floor below a fire may have immediate salvage concerns.

3. Large and multi-story buildings will likely be protected with a wet sprinkler system.

a. Ladder company personnel must be familiar with sprinkler system design and shut down procedures.

b. A misunderstanding of sprinkler system design can lead to excessive water damage, as water continues to flow from the system even after the fire is knocked down.

I. De-watering is an important element in salvage operations.

1. Use of squeegees and mops to remove excess water not only decreases property loss, but demonstrates a high level of customer service to the public.

III. Communication considerations

A. The benchmark “Loss Stopped” is transmitted to the Incident Commander upon completion of loss control activities.

Salvage Operations

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

Salvage operations include those activities that are required to stop any direct and indirect fire damage, and to minimize the negative effects of firefighting operations. Effective salvage operations should minimize losses from water, smoke, or actual firefighting efforts. This guideline provides the Albuquerque Fire Department approach to conducting salvage operations.

Guideline

Since almost every structural fire can create the need for some form of salvage operations, they must be considered as early activities in the operational plan. Aggressive salvage operations may involve early smoke removal or the use of salvage covers to protect a building's contents, and may stop or reduce damage. It is the responsibility of Command to ensure that salvage is performed at all fires or other incidents posing potential damage to property. All operational personnel should do whatever possible to minimize the effects of fire-related losses.

Operational Guidance

I. Salvage considerations

A. Salvage operations consist of efforts aimed to minimize damage from fire, smoke, heat, water, and weather.

B. Salvage operations are undertaken with the purpose of protecting the contents of the structure.

C. Salvage should begin early and continue throughout the firefighting operations.

D. Specific issues should be considered when addressing salvage.

1. The extent and location of the fire.

a. Salvage efforts should begin in areas most severely threatened by damage. In most cases these are areas directly adjacent to or below the fire area.

b. Additional salvage activities should expand outward until all areas of potential loss are protected.

2. The type, value, and location of contents.

    a. Consideration should be given to the inherent value of contents when performing salvage operations.

    b. Business records may have high value to their owners while photos or other family mementos may have a high personal value to the property owner.

3. Recognition of existing and potential damage sources.

    a. All firefighting activities have the potential to damage property and contents.

    b. The key to successful salvage is to distinguish between excessive damage and damage that is required to successfully put out the fire.

    b. Aggressive loss control activities reduce the damage incurred during firefighting operations.

4. Timely estimate of required resources.

    a. An early request for manpower and salvage equipment can significantly reduce loss.

    b. The first company assigned to salvage should consider the size-up factors and request sufficient resources to conduct successful salvage operations.

F. Two basic concepts for property protection exist:

1. Collect and cover.

    a. When removal is not practical, contents should be grouped in the center of rooms, raised off of the floor, and covered with salvage covers to provide maximum practical protection.

2. Remove.

   a. In some cases the contents of all threatened areas can be removed to a safe location.

G. Some amount of water damage is inevitable when fighting fire, but excessive water damage can and should be avoided.

   1. It is incumbent upon company officers to assess the need for early salvage operations.

   2. The following example illustrates the need for salvage duties to be initiated prior to the fire being determined "Under Control."

      a. If the fire is in the attic space, aggressive fire attack operations are required and it is understood that much of the ceiling will need to be removed.

      b. If the IC receives communication that the fire is above the attack team, the IC can coordinate and dedicate resources to salvage operations.

      c. Once the Ladder has completed the Roof Sector priorities and the Rescue has completed the primary search, these units could be reassigned to salvage duties.

H. Once the fire is “Under Control,” salvage operations need to continue.

I. Salvage operations should not create needless loss to property.

   1. Salvage cover placement not only protects remaining property of value, it may also serve as a means to protect the area of fire origin for pending fire investigation.

J. Salvage operations must be given high priority when faced with large and multi-story structures.

   1. The contents of many large commercial occupancies may be of more total value than the structure itself.

2. The floor below a fire may have immediate salvage concerns, specifically from water used in firefighting operations.

3. Large and multi-story buildings will likely be protected with a wet sprinkler system.

   a. Ladder company personnel must be familiar with sprinkler system design and shut down procedures.

   b. A misunderstanding of sprinkler system design can lead to excessive water damage, as water continues to flow from the system even after the fire is knocked down.

K. De-watering is an important element in salvage operations.

1. Use of squeegees and mops to remove excess water not only decreases property loss, but demonstrates a high level of customer service to the public.

2. Common salvage equipment includes salvage covers, brooms and squeegees.

II. Command considerations

A. The Incident Commander or the loss control officer should meet with the property owner or responsible party, to determine or identify salvage priorities.

1. The earlier this can be performed, the greater the opportunity to identify high value or high priority items or areas and establish salvage priorities.

2. In some instances, when safe to do so, the property owner or occupant may be escorted through the building by AFD personnel.

B. Salvage operations will not be conducted in areas that are subject to or potentially subject to collapse.

C. Command is responsible to ensure that personnel are wearing SCBA until atmospheric monitoring confirms that it is safe to operate without such protection.

D. The benchmark “Loss Stopped” is transmitted to the Incident Commander upon completion of loss control activities.

E. Command or the Loss Control Officer should schedule a return walkthrough by Fire Department personnel to insure post-incident damage is not occurring.

F. Arrangements must be made to collect salvage covers when the salvage covers must be left on scene.

Overhaul Operations

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

Overhaul operations include those activities that are required to find and eliminate all remaining fire, control fire loss, stabilize the fire event and secure the structure. Effective overhaul operations should eliminate the potential for a rekindle. This guideline provides the Albuquerque Fire Department approach to conducting overhaul operations.

Guideline

In addition to searching for and extinguishing hidden fires, operations that should routinely be conducted during overhaul include determining the causes of the fire, recognizing arson, and obtaining data for the official report. Additional elements of effective overhaul operations should incorporate efforts toward the preservation of evidence and securing the fire scene.

Command should ensure that overhaul operations are conducted safely and should coordinate any overhaul activities with fire investigators. All operational personnel should familiarize themselves with the operational basis for overhaul operations.

Operational Guidance

I. Overhaul

A. Overhaul should begin as soon as all visible fire is extinguished.

1. Fire suppression operations often overlook small pockets of fire concealed in construction voids or hidden under debris.

2. Overhaul activity must include a thorough search of the fire scene to detect and extinguish "hot spots" before they rekindle.

B. An overhaul operational plan should be based on specific criteria.

1. Fire location.

2. Fire intensity.

3. Fire extent.

4. Type of building construction.

5. Type, amount, and distribution of contents.

C. Firefighters assigned to overhaul operations must constantly be aware of the damage being done to the structure when overhauling.

1. Damage during overhaul is necessary, but it needs to be justifiable.

2. Unnecessary damage is unacceptable.

D. Techniques and considerations to be used in assessing possible fire extension and need for overhaul include the following:

1. All firefighters have felt warm walls at structure fires. To best determine the location of fire extension in walls, firefighters should LOOK, LISTEN, AND FEEL prior to breaching the walls.

a. LOOK at the fire's area of origin, follow the fire behavior, and consider the likely fire spread based on the building's construction.

b. LISTEN for the popping and snapping sounds of burning wood.

c. FEEL every location that was exposed to heat.

d. Breach walls appropriately.

2. Firefighters should use the "15-Second / 2-Minute Rule" to determine whether a wall, that is warm to the touch, needs opening.

a. It may be holding residual heat and may cool on its own.

b. Place the back of an ungloved hand on the wall. If the hand cannot be kept against the wall for at least 15 seconds, open the wall.

c. If the hand can be left in place for 15 seconds but is still warm, return to the same spot two minutes later. If still warm and the crew's instincts are to open it, open it.

3. Any sheetrock-sheathed wall that has any smoke or heat damage has no remaining value and will be torn down and replaced once reconstruction of the property begins. When in doubt, open it.

4. The thermal imaging camera (TIC) is a useful tool to locate hot spots and determining when and where to open walls and ceilings.

5. Specific locations in a structure which should always be considered for hidden fire extension.

    a. Any floor, wall or ceiling areas with evidence of extensive charring should be examined during overhaul.

    b. Other areas to check include any openings.

        i. Wooden door jambs.

        ii. Air conditioning vents and registers.

        iii. Baseboards, door and window casings.

        iv. Around light fixtures and electrical outlets.

    c. Attic fires can present a high potential for rekindle if the insulation has been exposed to fire.

        i. Large areas can receive fire damage and can be located in difficult-to-reach areas.

        ii. In some cases, all insulation must be removed to extinguish all remnants of fire.

    d. Plenum spaces, soffits, and pipe chases also can provide a possible route for fire to spread throughout a structure.

    e. Window and door frames.

    f. All shafts and vertical voids.

    g. All horizontal voids such as attic/cockloft and truss floor systems.

6. If potential for spread to the floor above exists, first remove baseboards on the floor above the fire to determine if more wall opening is needed.

7. If charring is present, open in all directions moving outwards from the charred area until charring is no longer present.

E. Tools utilized in overhaul operations include the following:

1. Axes.

2. Bars.

3. Pike poles.

4. Thermal imaging camera.

5. Scoop shovels.

6. Salvage covers.

7. A charged line should be considered mandatory.

F. Most fireground injuries occur during overhaul. Firefighter safety provisions which must be observed during overhaul operations include the following:

1. Structural stability must be assessed prior to overhaul beginning, and must continue throughout the entire overhaul operation.

2. All utilities must be secured prior to beginning overhaul operations.

3. Full PPE and SCBA must be worn.

a. Incomplete combustion and accompanying CO production are at their height during overhaul operations.

4. Continued use of PPV to help maintain visibility and removal of residual heat and smoke.

    a. It must be remembered, however, that overhaul is the search for remaining HIDDEN fire.

    b. If the extent of fire spread and exact fire location is not known, PPV must not be initiated.

II. Preservation of evidence

A. Companies performing overhaul should weigh the importance of preserving evidence with the desire to immediately remove debris and completely extinguish all traces of fire.

1. It may be necessary to monitor spot fires until investigators arrive on the scene.

2. Overhaul operations may be supervised by an arson investigator. In this case, priorities include preserving the scene and any evidence for subsequent investigation.

2. Do not move possible evidence, such as containers or accelerants.

    a. Where circumstances prohibit this, evidence should be removed under the direction of a fire investigator.

III. Securing the fire scene

A. Securing the fire scene is also a function of overhaul operations.

1. Securing refers to those actions required to protect the structure and contents from any further loss after fire suppression companies have left the scene.

    a. Ventilation holes and broken windows should be covered to reduce weather damage and to help deter vandalism.

b. Broken glass should be removed from the frames of broken windows before installing any type of covering and always prior to leaving the scene.

c. Doors and windows may need to be boarded up to prevent unauthorized entry or vandalism.

2. It additionally includes any action required to insure the safety of all persons likely to visit the incident scene.

a. Once a hazard zone is established during firefighting operations, it cannot be abandoned prior to removing or stabilizing the hazard.

b. Overhaul operations provide a means of identifying and guarding hazards that cannot be removed or stabilized.

i. Depending on the severity of the hazard, it may be necessary to secure the scene with barricades, hazard tape, or a fire watch.

IV. Command considerations

A. The Incident Commander will ensure that fire area has been thoroughly overhauled and no hidden fire remains.

1. Command will be responsible for scheduling a post-incident drive-by or walk-through inspections of the fire building to eliminate any rekindles.

B. The last Company Officer leaving the scene will be responsible for insuring total fire extinguishment.

Electrical Utilities

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

The purpose of this guideline is to provide a basic description of electricity and any electrical utilities relevant to emergencies encountered by Albuquerque Fire Department units, as well as to identify relevant response considerations.

Guideline

Electricity is a utility that is often taken for granted. It is usually when an electrical problem arises that electrical hazards are fully considered. The Public Service Company of New Mexico (PNM) maintains the primary accountability for electrical utilities; however, AFD responds to reports of downed power lines and other electrical malfunctions. The most important factor at any incident involving electricity is life safety of first responders and the public.

Operational Guidance

I. Electricity

A. Electrical conduction can be more easily understood when compared to water flow.

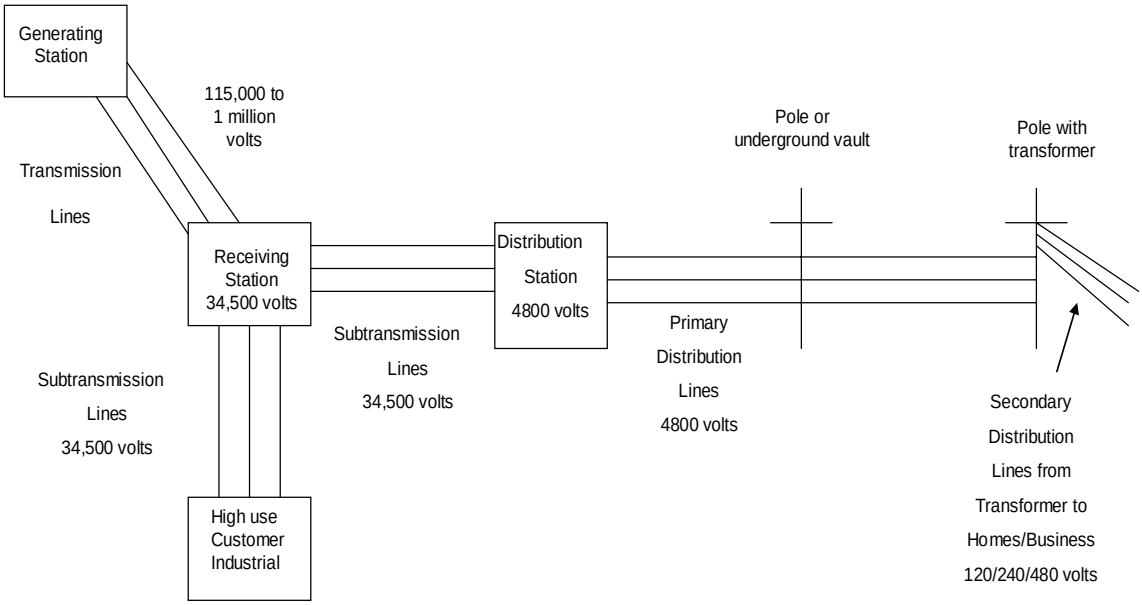
1. Table 1 illustrates the comparison between water flow and electricity.

Table 1		
Water	Can be compared to	Electrons
Hose lines		Conducting wires
Friction loss		Electrical resistance
Water pressure		Voltage
Water flow		Amperage

B. The electrical distribution system is much more complex.

1. Figure 1 illustrates a typical electrical distribution system.

Figure 1.



Wire Rules:

1. Larger wires do not always carry larger current. Look at the insulators and distance between them. Larger voltage = larger insulator size and greater distance between them.
2. Usually the highest crossarms have the highest voltages
3. 750+ volts = high voltage

C. Electrical utilities and delivery to specific occupancies.

1. Dwellings or small commercial occupancies.

a. Power is delivered at 240 volts maximum.

b. Overhead or underground wire delivery systems.

c. If delivered overhead (from a pole to the structure), it may be a two-wire or three-wire system.

i. A two-wire system is older service, providing 120 volts and single-phase service.

ii. A three-wire system is newer service, providing two lines with 120 volts each and one line neutral.

d. The main power disconnects are identified as follows:

i. Fuse(s).

ii. Circuit breakers.

iii. Levers at electrical utility boxes.

e. It is better to shut off branch circuits before shutting off the main power.

2. Commercial, industrial occupancies, large apartments, and hotels.

a. Power is delivered at 120 to 34,500 volts.

b. Delivery is provided by either overhead or underground wires.

c. If there are overhead wires, they may be quadraplex or open-wire triplex.

i. Quadraplex is four insulated wires.

ii. Open-wire triplex is three insulated wires, wrapped around a single bare neutral wire.

d. If there are underground wires, they may be fed into the following:

i. Electrical rooms.

ii. Fenced enclosures.

iii. Pad-mounted transformers (and may deliver up to 34,500 volts).

3. Complex occupancies including highrises, hospitals, and malls.

a. In these occupancies, expect underground delivery of electricity.

b. They may have an Uninterrupted Power Supply (UPS) room with numerous batteries connected together to deliver over 500 volts of power in case of power failure.

D. “Open neutral” and grounding issues.

1. To make the flow of electricity safe, an electrical current is completed when grounded.

2. Grounding provides a low resistance path to ground for currents resulting from damaged wiring or faulty equipment.

3. A continuous path to ground also facilitates the operation of over-current safety devices like blowing fuses and tripping of circuit breakers.

4. When not properly grounded, electricity will seek the path of least resistance to complete a circuit and get to ground, producing a potential electrocution hazard.

5. The following example demonstrates grounding.

a. Above-ground electrical wires that provide electricity to structures typically extend from the pole to the weatherhead located on the roof.

b. Most homes have two insulated “hot” wires of 120 volts each. These are wrapped around a non-insulated “neutral” wire which completes the circuit (it returns current from the home back to the transformer, then to ground).

c. In older homes and structures that have only two (no neutral) wires entering the weatherhead, the grounding may be accomplished through the metal water pipes.

d. AFD responds often responds to electrical emergencies that are due to a faulty ground.

   i. Faulty ground may be due to an “open” neutral.

   ii. The neutral wire designed to carry electricity back to the transformer becomes inadequate and no longer has the capability to conduct electricity.

   iii. This is usually due to a defective connection where the neutral wire enters the weatherhead.

   iv. Electricity, always trying to find a means to ground, will then find another path to ground. This may be through the metal lath in lath-and-plaster wall construction.

   v. Wall fires can begin when conductive metal lath heats up to a point that the wooden studs begin to char or burn.

e. A thorough investigation needs to be conducted when electricity is involved at an incident.

   i. Recent plumbing work may interrupt electrical ground.

ii. As old metal pipes rust and begin to leak, they may be replaced with plastic pipe that is commonly used today.

iii. If the metal pipe was previously serving as a path to ground, that path has now been interrupted and ground will be sought through another means in the structure.

II. Electrical hazards and safety considerations at incidents involving electrical service

A. Events involving electricity create conditions of high potential hazard.

B. Responders should exercise extreme caution during these events.

1. Never open sealed electrical boxes.

2. Never enter rooms labeled “High Voltage.”

3. Never remove power meters.

4. Do not apply water to transformer fires.

5. Do not re-energize or re-establish electricity to a structure.

6. While it may be advisable to do so at single-family dwelling fires, removal of electrical service at multi-family, commercial or industrial occupancies should only be completed after diligent consideration of the effect power removal will have on the structure and incident operations as a whole.

7. Consider conduction or grounding possibilities.

a. Do not use aerial devices unless otherwise advised by PNM.

b. Consider the implications of staging apparatus or walking and standing in water near downed lines.

III. Mitigating electrical emergencies

A. Generating, receiving, or distribution facilities are not to be entered until de-energized and a utility company escort is present.

B. Transmission towers should have an identification number near ground level. Do not use an aerial device to effect a rescue until the utility company gives permission for that operation.

1. Poles usually have an identification tag that indicates the party responsible. They usually also are equipped with grounding straps.

C. Responding to reports of **"**Downed wires."

1. Specific considerations should be taken in events where the wires run pole-to-pole and/or pole-to-structure.

a. Assume that all wires are live.

i. Energized wires do not always jump, pop, or spark.

b. Secure the area.

c. Clear the area at least one span (between transmission poles) away in each direction of the downed lines.

d. Remove civilians from danger.

2. Responding to events involving street vaults.

a. Street vaults can be identified by square manhole covers.

b. Do not enter and do not use water.

E. Streetlight emergencies.

1. Streetlights can carry either low or high voltage.

2. Newer lights - with photoelectric cell atop the pole or light - carry 240 volts.

3. Older lights may carry as much as 6,800 volts.

F. Traffic lights emergencies.

1. Traffic lights usually carry 240 volts.

2. Be aware that, if mounted on a street light pole, a traffic light may have street light voltages (as high as 6,800 volts).

G. Ballast emergencies.

1. A ballast is a transformer and capacitor combination designed to operate fluorescent lights.

2. A ballast can overheat and either smoke or leak.

3. Ballasts are normally hot to the touch.

   a. If it is so hot that you cannot keep a hand in contact with it, it is likely the problem.

   b. When investigating ballast emergencies, always wear PPE/SCBA – the drippings and smoke can be toxic.

4. Check the ceiling space above for fire and/or heat extension.

5. Either secure (remove) power to the fixture or remove the ballast.

H. Securing electrical utilities at fire incidents.

1. Whether by PNM or by firefighters, securing the electrical utilities is accomplished at most fire incidents.

2. Caution must continue to be exercised as faulty ground – through an open neutral, faulty wiring, or recent building modification - may prevent the elimination of electrical service.

Natural Gas Emergencies

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

The purpose of this guideline is to describe commonly encountered natural gas emergencies, and to define the Albuquerque Fire Department's accepted response protocol to those events.

Guideline

Natural gas is used in both commercial and residential properties as a heating and utility fuel. While the Public Service Company of New Mexico (PNM) has primary accountability for natural gas, the Albuquerque Fire Department responds to reports of gas leaks, smell of gas and blowing gas lines. As with other incidents, strategic goals at a natural gas leak are life safety, incident stabilization, and property conservation.

Operational Guidance

I. Natural gas

A. The New Mexico Motor Vehicle Code (New Mexico Criminal and Traffic Law Manual (66-7-6) describes Properties of Natural Gas as the following:

1. It is lighter than air.

2. It has flammable range is between 4-14%.

3. It has a ignition temperature of 1,000 degrees Farenheit.

4. It is non-toxic but is an asphyxiant.

5. It is odorless but a sulfur-based odorant (mercaptin) is added for safety.

   a. The odorant makes the gas indentifiable long before it is present at a dangerous concentration.

   b. The odorant can be scrubbed out of the gas as it passes through sand and dirt.

II. Pressure classifications

A. Natural gas is a potentially dangerous, compressible gas.

1. Gas pipelines with the highest pressure contain the highest energy storage potential and present the greatest risk.

2. Caution is always warranted when working around natural gas facilities.

3. Extreme caution must be exercised whenever transmission pipelines are encountered.

B. Natural gas is distributed through transmission and distribution mains and service lines.

1. Transmission mains are generally constructed of steel.

   a. Between 12-36” in diameter.

   b. May deliver gas at pressures up to 100 psi.

   c. Transmission mains deliver gas to smaller supply mains.

2. Distribution mains supply gas to customer areas, and are constructed of polyethylene, steel, or copper.

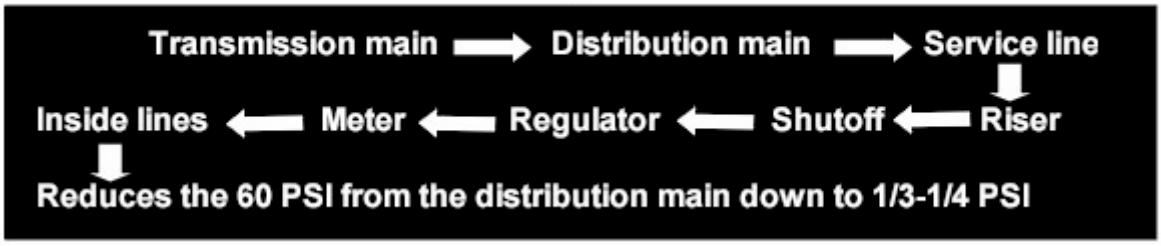
   a. Distribution mains may deliver gas at pressures up to 60 psi.

   b. Distribution mains provide delivery to service lines.

3. Service lines then serve gas customers.

C. A typical natural gas distribution system is shown in figure 1:

Figure 1



D. Figure 2 illustrates a natural gas distribution system.

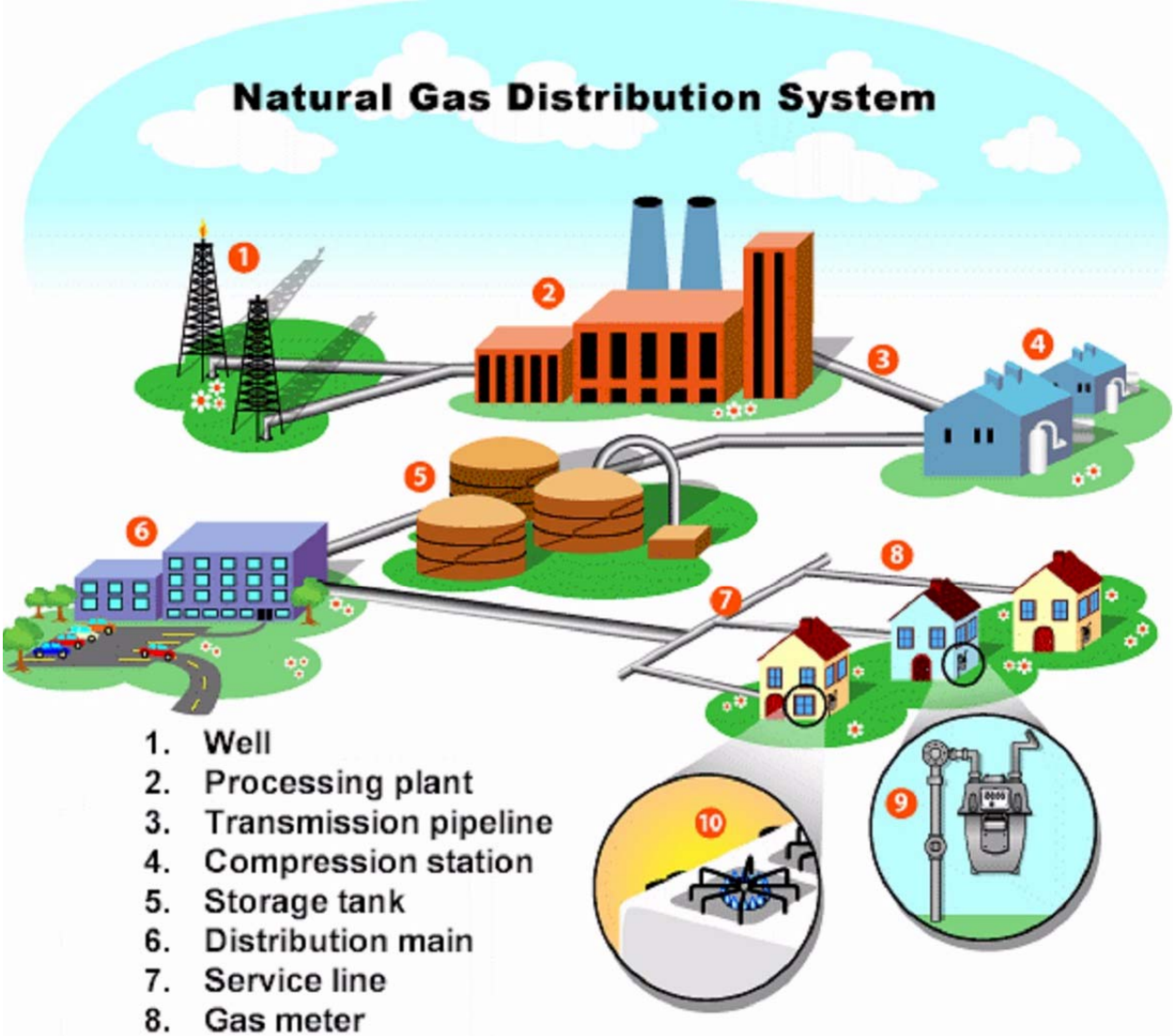

Natural Gas Distribution System
1. Well
2. Processing plant
3. Transmission pipeline
4. Compression station
5. Storage tank
6. Distribution main
7. Service line
8. Gas meter
9. Gas line
10. Appliance

Figure 2

III. Shut-off valves

A. Multi-family dwellings and commercial occupancies will have groupings of multiple meters.

1. PNM requires each individual meter have an identification tag so that individual units can be located and shut down; this prevents shutting down an entire group of units unnecessarily.

2. Location of meters and shut-off valves

a. Meters and shut-offs are usually found on the outside wall of a structure.

b. Meters and shut-offs may be found in crawl spaces below the structure, beneath outside staircases, in outdoor closets, underground garages, sidewalk vaults and basements.

B. When shutting off the gas utilities, the order of priority is important.

1. Appliance quarter-turn shutoff.

2. Meter quarter-turn shutoff.

3. Curb valve.

4. Street valve – PNM only.

IV. AFD HazMat response

A. AFD's two HazMat Squads (Squad 1 and Squad 3) are equipped with monitors for measuring natural gas concentrations.

B. On any call with a reported or suspected natural gas leak, AFD Dispatch will dispatch one engine company and one HazMat Squad.

C. When an inside leak occurs, or if a natural gas from an outside source is suspected of entering a structure, the Squad's resources must be used to ensure that a safe atmospheric condition exists.

V. Natural gas emergencies

A. Natural gas emergencies typically present as one of three types.

1. Inside leak.

2. Outside leak.

3. Leak with fire.

B. Inside leak tactics.

1. Minimum firefighter protection should include bunker gear, SCBA, extinguisher and tools.

2. Determine the extent of the leak and any evacuation needs.

3. Take appropriate measures if a heavy odor of gas is detected.

a. Promptly evacuate occupants.

b. Turn off pilot lights and appliance valves to reduce any ignition sources and to reduce explosion hazards.

c. Do not operate light switches, flashlights, radios and avoid walking on carpets to minimize the generation of static electricity as an ignition sources.

d. Shut the gas off at the meter.

e. Open windows once gas is shut off.

f. Instruct the occupants to not re-enter the structure until PNM has turned gas back on and relit the pilots.

i. Stand by with occupants until PNM arrives.

4. Take appropriate measures if a faint odor is detected.

a. Check pilot lights to determine if they have gone out.

i. AFD personnel are not allowed to relight pilots.

b. Apply a soapy water solution on inside gas lines to identify the location of a leak.

c. Ventilate the occupancy by opening doors or windows.

d. Instruct a HazMat squad to assess conditions with a gas monitor.

e. Suggest that the occupants have PNM or plumbing/heating service investigate further.

i. Advise that the occupants call 9-1-1 if they start to feel ill.

5. Take appropriate measures when ventilating inside leaks at multi-story buildings.

a. Vent the highest level first, then move to the lower levels.

b. Consider positive pressure ventilation (PPV).

C. Outside leak tactics.

1. Minimum firefighter protection includes bunker gear and SCBA.

2. Eliminate all potential ignition sources to reduce explosion hazards.

3. Evacuate as needed.

a. See the Emergency Response Guide (ERG) for suggested perimeters.

4. Stage upwind of the suspected leak source.

5. Stretch and charge a handline.

6. If gas cannot be shutoff, gas can be dissipated using a wide fog pattern.

7. Note that static electricity can be created as gas leaks out of its piping.

   a. If the pipe is metal, the static charge/current can be drawn off and safely dissipated into the ground by the conductive pipe itself.

   b. If the pipe is plastic, a static charge should be expected. In this case, do not touch the piping, since it could cause a small spark to be created.

   c. Class A foam may be used to prevent ignition from static electricity, but caution must be exercised in order to not flood the area.

8. Do not plug or clamp leaking gas lines.

D. Gas leak with fire tactics.

1. Protect exposures.

2. Let it burn until gas is shut off.

3. Evacuate the area as necessary.

Wildland Operations

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

The purpose of this guideline is to define the Albuquerque Fire Department's Wildland Firefighting program, and to ensure that all uniformed members meet the minimum qualification and standards required to safely and effectively participate in wildland urban interface firefighting.

Guideline

This guideline describes how the Albuquerque Fire Department deploys manpower and resources to wildland fires within the city limits, as well when assisting County, State, and Federal agencies in accordance with mutual aid agreements.

Operational Guidance

I. AFD wildland program/resources

A. Qualified personnel must meet specific criteria.

1. All AFD operational personnel will hold Red Card certification.

2. Many personnel possess additional certifications.

3. One Wildland coordinator is assigned to the AFD Fire Academy.

B. Designated Wildland Specialty Stations in each AFD District are strategically and geographically located to provide rapid response, size-up and initial attack on wildlands events.

1. Table 1 shows the location of AFD Wildland stations.

Table 1

District One	District Three	District Four
Station 1	Station 8	Station 7
Station 10	Station 12	Station 17
	Station 16	Station 18
		Station 21
		Station 27

2. Equipment has been issued to engines at all specialty stations, and includes McLeod tools, Pulaski tools, combitools, shovels, rakes, backpack pumps, light-weight forestry hose, adaptors, and nozzles.

3. Wildlands Stations 1, 8, 10, 17, and 27 each have one operable brush truck, as well as a chain saw, mop-up kit, drip torches and portable pumps.

   a. Station 27 houses a 2500-gallon water tender.

D. All AFD apparatus have been equipped with fire shelters, web gear, and a radio pocket for each riding position.

II. Training and certification

A. All AFD personnel shall receive the following training:

1. I-100 Introduction to Incident Command.

2. S-130 Basic Wildland Fire Suppression.

3. S-190 Basic Fire Behavior.

4. L-180 Human Factors on the Fire Line.

B. For personnel who wish to be assigned to Wildland Task Force stations (through the bid process), the following additional training is required:

1. S-131 Advanced Fire fighter certification (and completed task book).

2. S-211 Portable pumps and water use.

3. S-212 Wildland Fire Chain saws (“Level A Faller” minimum).

4. S-201 (S-281) Supervisory concepts and techniques.

C. Only personnel who have completed S-212 Wildfire Power Saws and maintain a current level “A” faller - or greater - certification (and have required PPE on hand) may operate power saws at wildland fires.

1. PPE is in addition to standard wildland gear and includes the following:

a.. Wildland gloves.

b. Eye protection.

c. Chain saw chaps.

d. Hearing protection.

D. All personnel are to complete an annual refresher/recertification process early each year, prior to start of the fire season, to receive their Red Card. This process includes the following:

1. RT-130 Wildland Refresher class.

2. Pack test (further definition in Appendix A).

a. A three-mile walk, carrying a 45 pound pack, completed in less than 45 minutes and 45 seconds.

b. Firefighters with a serious medical condition, which would be exacerbated by performing the pack test, may qualify at the light or moderate level.

i. Once the medical condition is cleared, the firefighter must complete the pack test at the arduous level.

E. AFD Fire Academy training.

1. The Wildland Special Operations Officer will conduct and/or coordinate all wildland training for AFD personnel, including any advanced wildland training.

    a. The Wildland Special Operations Officer will be assisted in providing training by a working group consisting of certified wildlands engine bosses

    b. Advanced wildland training for certification as squad boss, engine operator or engine boss primarily occurs in the fall and spring

    c. Advanced training is described in the National Interagency Incident Management System Wildland and Prescribed Fire Qualification System

2. The Fire Academy is responsible for tracking and maintaining all training records and will produce a Red Card for all AFD personnel

III. AFD wildland personnel response

A. Personnel must be fully prepared to respond to wildland incidents (with complete PPE and equipment on their respective apparatus) at the following times.

1. At any time during AFD's wildland season (April 15-September 15).

2. Whenever “red flag” conditions are reported via NOAA and AFD's Dispatch announces these conditions by radio to all personnel during morning announcements

3. Personnel wishing to access NOAA may do so via the internet at http://www.srh.noaa.gov/abq/firewx/fw-3.php, (click on Zone 106).

IV. Personal protective equipment for wildland firefighting

A. Personal wildland equipment is the responsibility of each individual. It is the firefighter's responsibility to ensure gear is complete and in working order (e.g., helmet straps have been affixed and adjusted).

B. Wildland gear is issued by the AFD Logistics Office to individual firefighters.

1. Each firefighter is responsible for equipment issued to them.

2. It is the responsibility of any firefighter missing equipment to contact Supply for replacement.

3. Personnel who arrive at a fire without required PPE will be removed from the hazardous area and may face disciplinary action.

C. Required PPE includes the following:

1. Wildland helmet with shroud and chin strap.

2. Headlamp with extra set of fresh batteries.

3. Wildland goggles.

4. Long-sleeve Nomex fire resistant shirt.

5. Fire resistant pants.

6. Leather gloves (can be structural firefighting gloves).

7. Leather boots that are approved for wildland firefighting.

8. Current Red Card.

D. Wildland fires involve operations that may become very physically demanding in hot, fast-moving, and dangerous environments. They may additionally be of extended duration. Since heat and dehydration can be a major safety hazard, suggested personal items may include the following:

1. Water bottles.

2. Food and/or power bars.

3. Extra gloves and socks.

4. Pocket knife or Leatherman.

V. Wildland firefighting equipment assigned to units

A. All AFD units have been issued the following equipment for each riding position.

1. Web gear with a radio pocket.

2. A fire shelter.

B. Some units have been assigned wildland tools which must be on the apparatus during the wildland fire season. Once the fire season is over, the company officer may remove the wildland gear from the truck and secure them until next fire season.

VI. Firefighter safety is the priority on all wildlands incidents

A. All firefighters are accountable for their own safety and that of their crew.

1. All firefighters must be familiar with wildland firefighting's accepted safety parameters (listed in the Wildland Appendix).

a. 10 standard firefighting orders.

b. 18 watch-out situations.

c. Urban-interface “Watch–outs**”** (listed in the Wildland Appendix).

2. It is important for AFD personnel to acknowledge that the hazards on a wildland incident can vary from the typical hazards of a structural fire scenario.

3. Any member of any crew should speak up should they notice a significant change in fire behavior, wind direction, or weather conditions.

B. Company Officers are responsible for the safety of their crews.

1. Wildland fires demand that Company Officers maintain a high level of awareness of crewmembers' whereabouts and condition.

2. Crewmembers can easily become spread out and separated.

3. Company Officers must maintain communications with and control over crewmembers.

4. Wildland firefighters have traditionally utilized the the buddy system to watch out for each other. Company Officers may initiate this for their crews for improved personnel accountability.

C. Heat can be a major safety problem on wildlands events and crews are often required to work for a prolonged duration in this environment.

1. Personnel should be kept hydrated. All personnel should carry personal canteens or bottled water and have access to drinking water.

2. All members should be physically fit and mentally prepared for a potentially very hot, fast-moving, and dangerous environment.

VII. Levels of response to reported brush or wildland fires

A. Most brush fire or wildland incidents within AFD's jurisdiction can be handled by a single engine company.

B. All fires will be coded by AFD Dispatch in accordance with the Emergency Fire Dispatch System for wildland responses. Table 2 details the coding and appropriate response.

Table 2

Call Coding	Description	Units Dispatched
67 Bravo	small outside fire	Closest engine
67 Delta 2	brush/grass fire	Closest engine and closest brush truck
67 Delta 3	large outside fire	Closest engine, closest brush truck, on duty Engine Boss and Battalion 4

67 Delta 1	wildland fire	Closest engine, closest rescue, 2 wildland engines, 2 brush trucks, on duty Engine Boss, 2 Commanders (including Battalion 4), 1 squad, Fire Logistics to bring wildland trailer

VIII. Wildlands strategies and tactics

A. The operational priorities for wildland fires are the same as for structural firefighting.

1. Life safety.

2. Property conservation.

3. Incident mitigation.

B. Wildland fires often present a large area of rapidly spreading fire. The critical decision is often where to attack the fire to the best advantage.

1. The basic wildland fire philosophy is to aggressively stop the forward progress of fire whenever possible. This is typically done by cutting fireline to stop a low-running fire (removing fuel).

2. Evacuation of individuals and protection of exposures in the path of the fire is the priority when immediate fire control is not possible. Protecting exposures typically involves removing flammable material from the immediate area around structures and wetting the structures down.

C. Properly scout and size-up a wildland fire before committing resources and potentially endangering personnel.

1. Small fires can be scouted and sized up quickly, often from the truck upon arrival.

2. Larger and fast-moving fires require accurate assessment of fire conditions, ensuring appropriate mobilization of resources as well as a safe and effective fire attack.

3. A well-constructed and well-communicated plan given to all personnel on the scene will help ensure firefighter safety.

D. Staging.

1. If the first-arriving unit finds a small fire one unit can handle, the Company Officer will cancel all other units, scout and size up the fire and initiate fire control activities.

2. If the first-arriving unit finds a large or rapidly growing fire and identifies a need for additional resources, the following steps should be taken:

   a. The Company Officer will assume command.

   b. The Company Officer will request AFD Dispatch upgrade the event and dispatch more units.

3. The second-in unit on a major fire will determine a Level 2 staging location and announce that location over the radio upon arrival.

4. All other resources will report to the staging area and wait for an assignment. While standing by, all personnel will don the appropriate wildland gear including web gear with a fire shelter.

E. Size-up and deployment of units.

1. The Company Officer will scout and give an inital size-up of the fire according to the following parameters.

   a. Exact location.

   b. Size (in feet or acres).

   c. Fuel type (grass, brush, trees).

   d. Fire behavior.

i. Flame length and speed.

ii. Is it creeping, running, torching, or crowning?

e. Exposures.

f. Hazards (such as, propane tanks or power lines).

g. Any additional resources needed.

h. The location of escape routes and safe zones.

i. Identify a minimum of two each.

2. After scouting the fire and providing a size-up, the first-in Company Officer returns to the Staging Area.

a. The first-in Company Officer should brief the crews, communicate a plan of attack, and deploy units on tactical assignments.

b. This may include designating sectors.

c. Specific radio channels may be assigned, as needed, in coordination with AFD Dispatch

i.. If outside resources have been called to the incident, the Incident Commander or AFD Dispatch must confirm effective communications with those units (using Bendix King radios if necessary).

ii. In the case that both AFD and BCFD are on a wildland incident, providing or receiving mutual aid, the agency first on-scene will determine the tactical channel to be used. This must be communicated through AFD Dispatch.

d. Fire conditions, tactical effectiveness, and condition of crew must be continually reevaluated throughout the event.

F. Mop-up.

1. After primary line work is completed and the fire is declared “Under Control,” many things remain to be done to make the fire line safe and put the fire out completely.

2. The objective of mop-up is to put out all fire embers or sparks to prevent them from crossing the fire line

G. Triaging structures.

1. Some wildland fires threaten structures. Company officers will need to quickly determine whether a structure is defensible and what resources and strategies are needed to protect those structures deemed to be salvageable.

2. Each structure that is triaged will be placed in one of the following categories:

a. Needing little or no attention for now.

b. Needing protection but savable.

c. Hopeless. No resources will be committed to these structures.

i. The fire is making significant runs (especially if the distance between the structure and adjacent fuels is less than two times the flame length of approaching fire).

ii. Spot fires are igniting faster than crews can extinguish them.

iii. Water supply is running out or is already depleted.

iv. Firefighter safety is jeopardized in any way (e.g., escape route has been cut off or it is threatened by fire)

v. The structure’s roof is 25% or more involved in fire**.**

vi. Interior rooms are involved, windows are broken in windy conditions, or adjacent structures are threatened or involved.

3. Other factors to consider when making decisions about the viability of efforts to save particular structures.

   a. Construction material (combustible, non-combustible), decks, gables that might trap embers, building size, arrangement, proximity to other structures, time needed to create a defensible space.

   b. Fire behavior and intensity, including flame lengths, rate of spread, spot fires, time to flame front arrival.

   c. Firefighter safety including ingress/egress, identification of and access to safety zones and escape routes, hazards such as power lines or propane tanks.

   d. Availability and location of resources.

4. If resources are limited, protect a group of structures rather than a single structure.

5. Firefighter safety is the number one factor to consider when deciding whether or not to commit resources to protect a structure.

6. When evaluating structures to protect (as well as other operational objectives), consider the following:

   a. What is the worse case scenario?

   b. What will probably occur?

   c. What will the timing be?

   d. What can be done with available resources?

IX. AFD Dispatch accountabilities during a major wildland incident (67 Delta 1)

A. Because a major wildland incident may involve a large geographical area, may spread quickly, and involve many resources in fighting the fire, coordination is essential.

B. Upon determination (by AFD Dispatch or field units) that a 67 Delta 1 Wildland Fire is in progress or is imminent, AFD Dispatch will take appropriate action.

1. Dispatch only Wildland stations to the incident.

2. Dispatch an on-duty AFD engine boss.

3. Advise AFD's Deputy Chief of Operations of the incident size and its location.

4. Notify the Wildland Special Operations Officer.

5. Notify Bernalillo County Fire Department of the incident size and location, and request a mutual aid wildland response (including a Battalion Commander to join AFD's Incident Command), if so requested by AFD's Incident Commander on-scene.

6. Notify New Mexico State Forestry at 505-867-2334 or 505-350-3456.

7. Establish an intra-agency radio frequency.

8. Assign a dispatcher monitor the incident at all times.

9. Notify Red Cross of the need for rehab units.

10. Notify the AFD Field Operations Center of the possible need to call in off-duty “Red Carded‘ firefighters.

11. Notify Albuquerque Open Space, Albuquerque Police Department and Bernalillo County Sheriffs Department.

12. Obtain current weather conditions.

13. Dispatch the AFD Public Information Officer.

14. Dispatch AFD Logistics Office personnel with the wildland trailer.

X. Initial Incident Command priorities on a major wildland fire

A. Establishing a Command Post as soon as possible.

1. It should be in a safe location and should not have to be moved if the fire changes direction or expands.

2. It should be in an area with sufficient space for a helicopter landing site and room for other vehicles, including AFD's Mobile Command Unit, if the Incident Commander requires it.

3. It should have all relevant resources on hand, including a set of maps to plot the progress of the fire(s), status of fire mitigation efforts, location of exposures, access points and limitations, known hazards and any other information reported by units in the field.

B. Establishing ICS with Geographic Divisions as soon as possible

1. Commanders with Urban/interface areas within their jurisdiction should have a complete set of aerial photos of their areas.

2. Effective communications with field units, in particular Commanders in charge of Geographic Divisions, must be confirmed because continually updated and accurate field reports are essential for Command decisions on these types of incidents.

XI. Mobilizing additional resources for large-scale or escalating wildland incidents

A. An expanding wildland fire can quickly outgrow AFD's available resources.

B. When this occurs mutual aid and additional resources can be requested (e.g., BCFD, Los Ranchos Fire Department, Corrales Fire Department, NM State Forestry).

C. As other agencies become involved, it will be critical to coordinate resources utilizing and possibly expanding the Incident Command System.

D. Helicopters can be requested by Command for reconnaissance purposes.

1. The Albuquerque Police Department helicopter may be available for reconnaissance and may be requested directly by AFD Dispatch.

2. Any other helicopters or aviation resources will only be ordered by NM State Forestry. The process for requesting these resources is detailed below:

    a. The Incident Commander should request the resource (only Command has this authority).

    b. AFD Dispatch will contact the Bernalillo District of the New Mexico State Forestry Division Fire Management Officer (Dave Bervin 867-2334).

    c. AFD Dispatch will advise NM State Forestry of the incident location, the fire name, and Incident Commander (along with the IC's phone number and radio frequency).

    d. AFD Dispatch will advise Command of the helicopter radio designation, radio frequency, and ETA to the scene.

    e. Command will assign one person on the ground to be in communication with the helicopter - using a Bendix King radio - while the aircraft is assigned to the incident.

E. Heavy equipment (including bulldozers) can be ordered only by the New Mexico State Forestry Division.

Appendix A.

I. 10 Standard Fire Orders

1. Fight fire aggressively but provide for safety first.
2. Initiate all actions based on current and expected fire behavior.
3. Recognize current weather conditions and obtain forecasts.
4. Ensure instructions are given and understood.
5. Obtain current information on fire status.
6. Remain in communication with crewmembers, your supervisor and adjoining forces.
7. Determine safety zones and escape routes.
8. Establish lookouts in potentially hazardous situations.
9. Retain control at all times.
10. Stay alert, keep calm, think clearly, and act decisively.

II. 18 Watch Out Situations

1. Fire not scouted and sized up.
2. In country not scene in daylight.
3. Safety zones and escape routes not identified.
4. Unfamiliar with weather and local factors influencing fire behavior.
5. Uninformed on strategy, tactics, and hazards.
6. Instructions and assignments not clear.
7. No communication link with crew members/supervisors.

8. Constructing line without safe anchor point.

9. Building fire line downhill with fire below.

10. Attempting frontal assault on fire.

11. Unburned fuel between you and the fire.

12. Cannot see main fire, not in contact with anyone who can.

13. On a hillside, where rolling material can ignite fuel below.

14. Weather is getting hotter and dryer.

15. Wind increases and/or changes direction.

16. Getting frequent spot fires across line.

17. Terrain and fuel make escape to safety zones difficult.

18. Taking nap near the fire line.

III. Urban Interface Watch Out Situations

1. Wooden construction, wood shake roofs.

2. Poor access, one-way roads.

3. Inadequate water supply.

4. Natural fuels 30 feet or closer to structures.

5. Extreme fire behavior.

6. Strong winds of 25 mph or greater.

7. Evacuation of public (panic).

8. Structures located in chimneys, box or narrow canyons, on slopes of 30% or more or in continuous flashy fuel types.

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

9. Bridge load limits.

Appendix B.

I. Tool maintenance and reconditioning (Required safety practices)

All members using wildland tools and chain saws shall be required to recondition them immediately after use. Wildland tools and saws are to be maintained in optimum condition to prevent premature tool failure and reduce firefighter fatigue due to working with dull tools. AFD Supply will provide any needed maintenance equipment or replacement tools.

A. Hand tools.

1. Re-sharpen cutting edges with a hand file-do not use bench grinder.

2. Heads should be spray painted to protect against rust.

3. Cover cutting edges with duct tape to preserve sharpness.

4. Check handles for cracks and tightness.

5. Any nicks or roughness on the handle should be sanded smooth if possible; if the handle is deeply nicked or cracked and presents a potential hazard to the user, the handle should be replaced.

6. The handles should be given a coat of linseed oil.

B. Chain saws.

1. Clean chain saws thoroughly after use.

2. Sharpen chain (if properly trained).

3. Add fuel and bar oil.

4. Replenish saw kit with the following:

a. Scrench (combo screwdriver/wrench).

b. Two-cycle engine oil.

c. Bar/chain oil and chain files.

d. 6” mill bastard file.

e. Chain sharpening guide.

f. Spare spark plug.

g. Spare air filter.

h. Spare chain.

i. Five-gallon fuel can.

j. Falling wedges.

k. Falling axe.

l. Chaps.

m. Ear plugs.

n. Grease gun for bar tip.

Appendix C.

I. Fitness testing (Pack Test)

A. An important part of being a qualified firefighter is maintaining an adequate level of physical fitness to be productive and to maintain an adequate energy reserve to meet unforeseen emergencies.

B. Fitness must be demonstrated annually prior to receiving a Red Card. The current standard for fitness testing is popularly referred to as the "Pack Test." More accurately, it is a system of three tests, each intended to be equivalent to a particular level of work demand associate with various job duties.

C. The three levels are Arduous, Moderate, and Light. Table 3 details the three levels.

Table 3

Work Category	Test	Distance	Pack	Maximum Time
Arduous	Pack Test	3 miles	45 lbs.	45 minutes
Moderate	Field Test	2 miles	25 lbs.	30 minutes
Light	Walk test	1 mile	None	16 minutes

D. Recommended training for the Pack Test.

1. For maximum safety and benefit, firefighters should be encouraged to start training for fitness testing 4-6 weeks prior to the test.

2. It is best to start training with little or no weight, and establish a pace that will meet the time requirement.

3. Gradually increase weight and/or distance until the test requirement can be consistently met.

E. The pack test course.

1. The course should be relatively flat and have a firm walking surface. Out-and-back courses have the advantage of canceling out the effects of wind and grade. The distance must be accurately measured with a measuring wheel or similar device.

F. Pack test equipment.

a. A scale to weigh packs (a hanging scale recommended).

b. Two stopwatches (a primary and a back-up).

c. Radios for monitoring safety.

d. Forms for documenting the test and for informed consent for testing.

e. Signs, safety vests, and other safety equipment.

G. Testing at altitude.

a. Candidates performing the work capacity tests at an altitude of 4000 feet or greater should be acclimated to the environment.

b. The maximum time allowed to perform the test should be adjusted according to Table 3:

Table 3

Altitude Above Sea Level	Pack Test	Field Test	Walk Test
8,000-9,000 feet	90 Seconds	60 Seconds	30 Seconds
7,000-8,000 feet	75 Seconds	50 Seconds	25 Seconds
6,000-7,000 feet	60 Seconds	40 Seconds	20 Seconds
5,000-6,000 feet	45 Seconds	30 Seconds	15 Seconds
4,000-5,000 feet	30 Seconds	20 Seconds	10 Seconds

H. Health and safety of personnel during Pack Test.

a. Paramedics should be on hand at the test site to monitor and/or treat any personnel who may become ill or injured.

NMRMP AFD Deployment Guidelines

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

This purpose of this guideline is to define the manner in which "red-carded" Albuquerque Fire Department personnel will be selected and deployed to wildland firefighting assignments, under the New Mexico Resource Management Plan (NMRMP).

Guideline

Through an inter-governmental agreement (IGA) with the State of New Mexico, the Albuquerque Fire Department has committed the deployment of resources to support State efforts in wildland fire suppression activities. AFD will support the IGA with the resources identified in this guideline.

Operational Guidance

I. Staffing considerations

A. AFD has committed to send a maximum of 12 personnel for NMRMP fires.

1. One Type-1 engine with four personnel.

   a. One engine boss.

   b. One engine operator.

   c. Two firefighters.

2. Two Type-6 engines (brush trucks) with three personnel.

   a. One engine boss.

   b. One engine operator.

   c. One firefighter.

3. One rescue unit with two personnel.

   a. One EMT-Paramedic and one EMT-Basic.

   b. This unit can be double-staffed to work 24-hours-a-day on two 12-hour shifts.

B. When a request for resources is received, the AFD Field Operations Center (FOC) will begin calling overtimes for each position required to fill the full complement of the assignment.

C. Personnel must fulfill all required criteria to accept an assignment.

1. They must be immediately available.

2. They must be available for five days.

3. They must be present at Station 17 and ready to leave within one hour of notification.

4. They must arrive at Station 17 with all required personal gear, PPE, and limited personal items.

5. They must be qualified for the position they are accepting.

D. Personnel must fulfill all required criteria to be considered for assignment.

1. They must be currently “red carded”.

2. They must have appropriate certification and must have completed a task book for the position they are accepting.

a. Firefighter II.

b. Advanced firefighter (FFI).

c. Sawyer.

d. Engine operator.

e, Engine boss.

f. Current New Mexico State License for EMT Basic or Paramedic will be recognized.

3. They must complete the AFD FOC Wildland notification form by marking, “Willing to be Deployed.”

4. For each position, the member with the most qualifications will be ranked ahead of other firefighters with less training (i.e. FFI, sawyer, Bendix King radio operator, GPS).

E. Deployments are for a period of five days, and will include a combination of work off-site (WOS) status, along with the regular four days off. To maximize overtime opportunity for the responding member, the notifications will be made according to the following schedule:

1. If the assignment starts on a shift's first day off, members from that shift will be called for the assignment. Those members would work their four days off, and on the fifth day - when they are regularly scheduled to work at AFD – they would be placed in WOS for their first 24-hour shift while they are returning from the fire. Their return to work would be the next day at 0800, their regularly scheduled workday.

2. If the assignment starts on a shift's second day of the 48-hour shift, members from that shift will be called for the assignment. Those members would be placed in WOS for the remainder of that shift and would leave for the fire. They would work their four days off. Their return to work would be the next day at 0800, on their regularly scheduled workday.

II. Operational considerations

A. Units will be deployed out of Station 17.

B. Members will be required to inventory the truck before and after each assignment.

C. All equipment must be cleaned and refurbished prior to leaving Station 17.

D. Deployment equipment will be cleaned and readied for storage. The truck should be left in a ready state.

E. Engine bosses will turn in all necessary paperwork (crew time reports, emergency shift tickets, unit logs, and other forms) upon arrival to Battalion Commander 4.

F. Engine bosses should report any problems with apparatus, equipment, or personnel to Battalion Commander 4.

G. Brush 1 and/or Brush 10 will be used for out-of-town deployments. A designated pumper and rescue, which will have a Bendix King truck-mounted radio, will be set aside for wildland purposes.

H. Wildland deployment overtime hours will not be added in your regular overtime opportunities.

III. Personal gear

A. All personnel deployed on NMRMP assignments will ensure that they are equipped and deployed with all appropriate personal equipment.

1. Wildland gear (and bunker gear if going on a Type 1 engine).
2. Current red card.
3. Task book.
4. Sleeping bag and pillow.
5. Extra change of clothes, underwear, and socks.
6. Extra wildland PPE.
7. Bandana.
8. Small amount of food, water, snacks, or energy bars.
9. Toiletries, required medicines, towel.
10. Minimal electronic devices.
11. Flashlight.

Machinery Extrication

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

This guideline applies to all emergency incidents where a person is trapped, pinned or caught in a device with moving parts. It defines size-up, response modes, and the command structures that may be appropriate for machinery extrication operations. It also describes hazards that may be encountered on such operations, and the protective measures that should be employed to ensure AFD responder safety. It is the responsibility of all Command and Company Officers to be familiar with the employment of this operational guide.

Guideline

It is the direction of the Albuquerque Fire Department to establish the operational methods for maximizing effective victim extrication from machinery or other devices with moving parts, while ensuring rescuer safety. The basis of this guideline is NFPA 1670: Standard on Operations and Training for Technical Search and Rescue Incidents.

Operational Guidance

I. Definitions

A. Incidents requiring the need for extrication operations are varied, but may include the following:

1. Agricultural implements.
2. Industrial machinery.
3. Construction equipment.
4. Elevators and/or escalators.
5. Vehicles with Power Take Offs (PTOs)
6. Drive shafts, gears, and drive belts.

II. Scene size-up

A. Upon arrival, the first-arriving company officer will assume command, provide an appropriate size-up, acquire a tactical channel through Dispatch, and initiate specific measures that include the following.

1. Determine the scope and magnitude of the incident.

2. Request a Heavy Technical Rescue (Squad Two) response as needed.

3. Conduct a risk/benefit analysis.

4. Evaluate the integrity and stability of the affected machinery.

5. Determine the number of victims.

6. Determine the best access to the area where the patient is located.

7. Determine the patient's condition, and begin appropriate treatment - if conditions allow.

8. Determine the need for additional resources.

    a. May require expertise beyond our own capabilities.

    b. Consider the recall of off-duty equipment technicians and/or equipment dealers.

    c. If extrication attempts have failed, and as a last resort, a surgeon may be needed to perform a surgical amputation.

III. Hazard Identification

A. The Incident Commander should identify as many potential hazards as may be found within the incident, and ensure that responders take preventive measures to guard against injury. Common hazards that may be encountered during an extrication operation include the following:

1. Determine the presence of utilities and evaluate if utilities are disrupted or exposed.

    a. Affected utilities may include electrical, petroleum fuel products, water, sanitary, communications, or industrial gases, among others.

2. Determine the potential for product release and victim engulfment potential.

3. Evaluate the presence of specific hazards.

   a. Mechanical hazards, such as moving parts.

   b. Hazardous materials.

   c. Energized electrical equipment.

   d. Physical hazards, such as trip hazards, fall hazards, or sharp edges.

   e. High pressure steam, hydraulic, or gas lines.

4. Identify primary and secondary access points.

5. Determine how the patient is trapped, pinned, or caught.

IV. Rescue operations

A. Establish hazard zones and entry control. Restrict entry to only those who have a need to be within the general area.

1. Prevent unexpected machine movement. Remember that "for every action there is an equal and opposite reaction

2. Develop and communicate the Incident Action Plan (IAP).

3. Make the area safe for rescue operations.

4. Isolate (lockout/tagout) the machine or device to prevent machine operation.

   a. Ensure that all energy sources are brought to a zero mechanical state.

   b. All electrical and mechanical equipment shall be secured using appropriate lockout/tag out procedures per OSHA 29 CFR 1910.147.

5. Stabilize the machinery – using cribbing, chocks, or wedges - to eliminate the potential movement of machinery components.

6. Protect the patient from further harm using canvas covers or blankets.

7. Stabilize patient's medical condition while performing the extrication, if appropriate.

8. Consider the need for fire protection.

9. Support utilities, if necessary.

V. Extrication options and conventions

A. Disassemble and/or remove machine components.

B. If cutting off machine components:

1. Consider the risk of heat conduction to the patient.

2. Take appropriate precautions.

C. Displace machine components.

D. Manually reverse the machine’s moving parts.

VI. Tools of the trade

A. Suggested hand tools may include the following:

1. Hammers, pry bars, saws, or punches.

2. Cable cutters, come-a-longs, chains, wrenches, or socket sets.

B. Simple machines include inclined planes (wedges) or levers (pry bars).

C. Pneumatic devices include airbags, pneumatic chisels or airguns.

D. Power tools include drills or hydraulic tools.

E. Cutting tools include saws, torches, or grinders.

VII. Termination of operations

A. Upon determining the termination of operations, the Incident Commander should obtain a personal accountability report (PAR) from all sectors.

1. Provide a tailboard critique and consider a formal debriefing at a later date and time.

Swift Water Rescue Systems

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

The purpose of this guideline is to define the measures that should be considered when responding to flood channel or other swift water rescue incidents. They are intended to maximize responder safety, department resources, and victim rescue potential.

Guideline

Swift water rescue usually involves flood channels but may also involve both irrigation ditches and the Rio Grande. Flood control channels were designed to quickly remove rainwater from the city to prevent flooding. Swift water rescue is considered to be the most dangerous type of water rescue. Furthermore, flood channel rescue is considered to be the most dangerous type of swift water rescue.

Shore-based rescues are the preferred method of rescue from flood channels. It is the direction of the Albuquerque Fire Department that flood channel rescue operations be limited to shore-based rescues.

It is the responsibility of all companies assigned near flood channels to become familiar with their assigned rescue sites during flood conditions. It is also advised that companies drill on these rescue techniques on a regular basis, especially during the monsoon season.

Operational Guidance

I. Operational considerations

A. The “Albuquerque Metropolitan Arroyo Flood Control Authority” (AMAFCA) estimates that water in the arroyo systems can travel at speeds up to 35 MPH, depending on the size of the channel and volume of water. In contrast, the velocity of natural rivers, even in flood stage, rarely exceeds 11 MPH. The velocities seen in the Albuquerque flood channel system are unique, and are rarely seen elsewhere in the world. These “arroyos” have historically been the location of numerous fatalities and injuries following heavy rain fall.

B. Flood channel facts

1. The water pressure is nearly the same at the sides of the channel as in the middle, however, the helical flow tends to push the victim to the middle of the channel.

2. The slick, sloping nature of the channel walls makes it easy for rescuers to fall into the water and become victims themselves.

3. Arroyo hazards include high velocities, sloping channel walls, smooth bottom and debris in the channel.

4. When the speed of the current is doubled, the force of the water against an object in the current is quadrupled.

5. On average, three firefighters drown each year attempting swift water rescues. These rescues are low incidence and are considered high-risk operations.

II. Rescuer safety

A. "Self-sacrifice in rescue operations is traditional and commendable... and usually a useless waste" (Rescue 3 International). The desire to save a life that is already lost, especially a child's, can be fatal to a rescuer who ignores safety. Don't allow compassion for that which is already lost to overrule your better judgment.

B. Observe a five-foot rule. During flood conditions, anyone within five feet of any arroyo must wear a personal flotation device (PFD).

C. Anyone on the steep slope of an arroyo must be belayed with a lifeline.

D. Never purposely enter the water while being tied off with a lifeline. In the event that a rescuer falls in the water and he or she is attached to a lifeline, an attempt will be made to pull him or her out of the water by pulling on the lifeline.

1. If the endangered rescuer cannot be pulled out immediately, he or she must be cut free of the lifeline to prevent drowning.

2. All PFD's must have a knife attached. Rescuers should be prepared to cut themselves or other rescuers free of the lifeline if needed.

III. Personal protective equipment (PPE)

A. The following PPE will be worn for all flood channel rescue operations:

1. Swift water rescue helmet

2. Knife or safety cutter

3. Whistle

4. Personal flotation device (PFD)

5. Tennis shoes or laced-up boots with good traction soles

6. Work Gloves when handling ropes

B. Rain gear is suggested, but optional.

C. The following items *will not* be worn during flood channel rescue operations:

1. Bunker gear

2. Fire service helmets

3. Cowboy-style boots or other slick-soled footwear

IV. Self-rescue

A. The ability to perform self-rescue is a vital and primary skill for anyone involved in flood channel rescue.

B. The first action in self-rescue is in prevention. Take the necessary precautions to prevent falling in the water.

1. Tie-off with a lifeline

2. Wearing the proper PPE

3. Ensure that you are belayed by another rescuer.

C. If you do find yourself in the water, take specific actions.

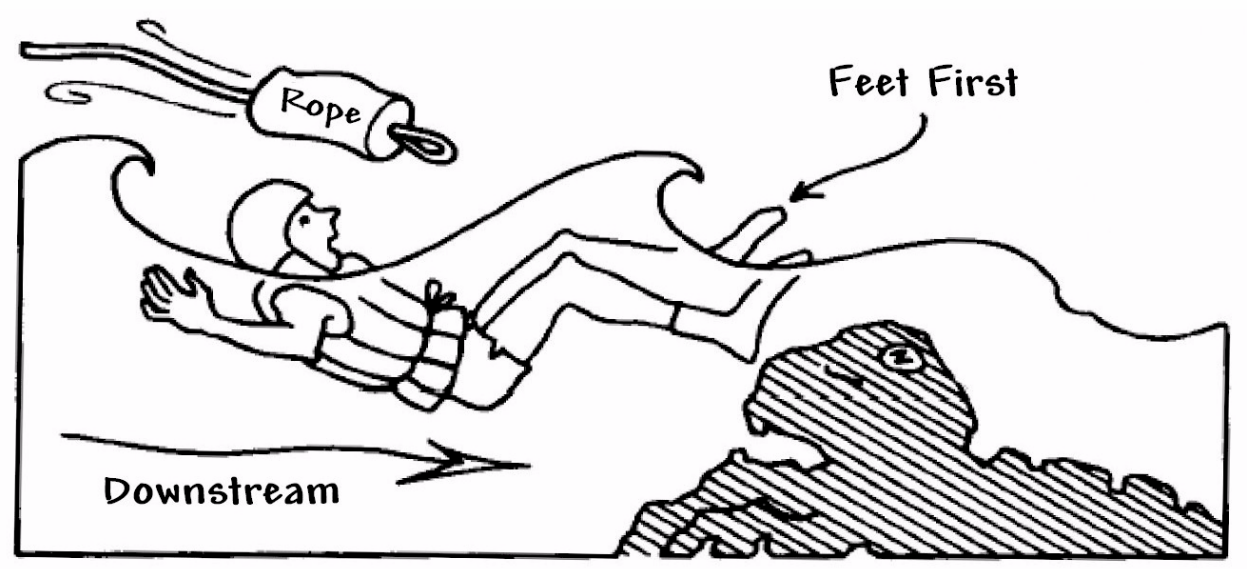
1. If you are still tied-off with a lifeline, the belayer will attempt to pull you out of the water.

2. If this cannot be accomplished immediately, the endangered rescuer must be cut free of the lifeline to prevent drowning.

3. Once free, the rescuer in the water should remove any remaining rope that may snag on a stationary object.

4. As illustrated in Figure 1, assume a safe swimming position. Face downstream, on your back, keeping feet near the surface of the water. This position minimizes the danger of entrapment, as well as allowing you to see downstream and to fend off obstacles with your feet

Figure 1



5. Do not attempt to stand up or stop yourself from going down stream by pushing against the arroyo bottom with your feet. Doing so invites a foot entrapment. Foot entrapment is usually caused when a swimmer attempts to stand up in moving water and gets a foot jammed into a crevice. The force of the current is usually enough to prevent self-rescue and drowning often results.

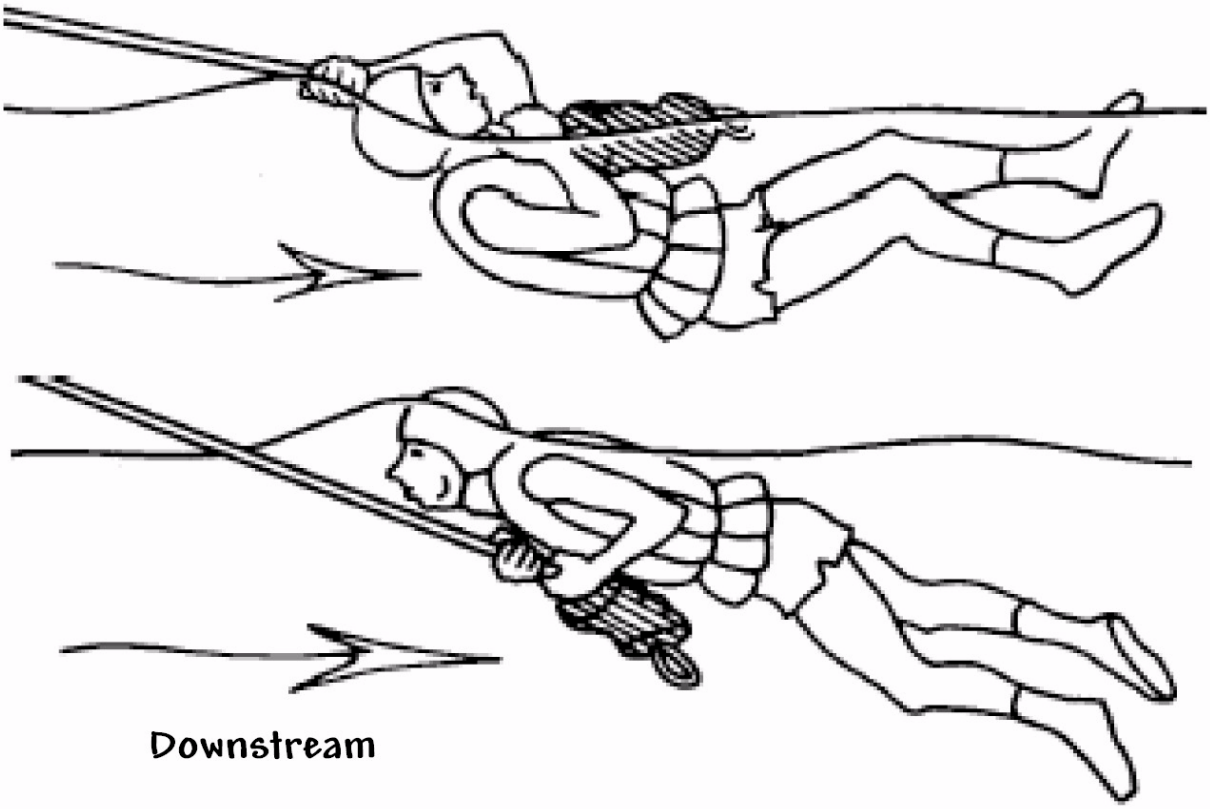
6. Your immediate objective is to get out of the water as soon as possible. Aggressively swim towards any eddies and do not attempt to stand up until you are out of the main current.

7. Be prepared for and expect a rescue attempt using throw ropes. If a throw rope is deployed to you, pull the rope to your chest, roll over on your back and put the rope over the shoulder away from the bank you are headed toward.

   a. Face downstream with the rope over your shoulder, angling your body at a 45º angle to the current. This body position, which is called a ferry angle, will cause the water to push

you more quickly toward the side of the arroyo. See Figure 2.

Figure 2



8. Do not grab the rope and face upstream, since this action will get you a face full of water and cause you to let go of the rope.

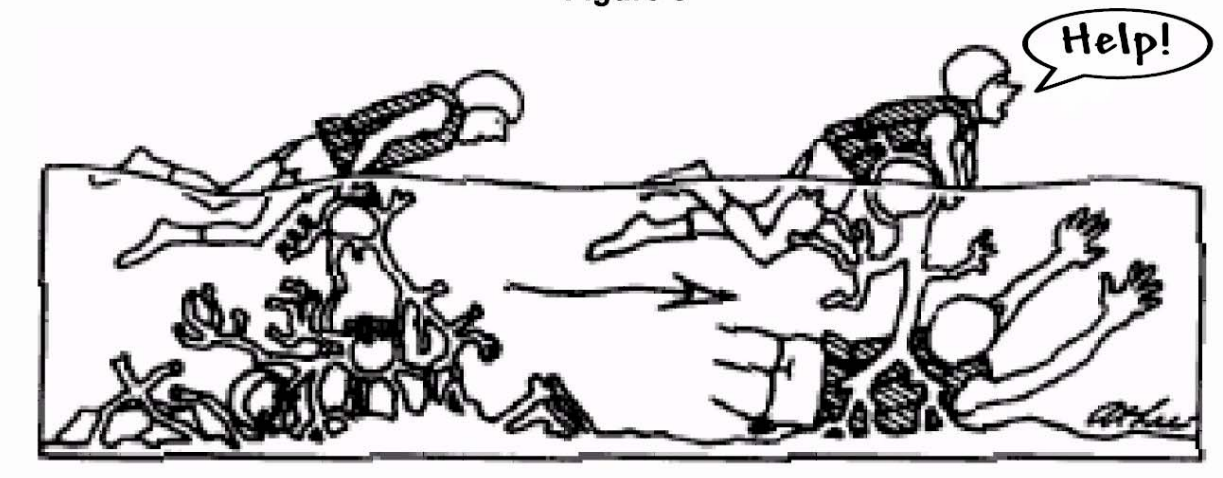
V. Special Hazards

A. In addition to obvious hazards, flood channel rescues may present other less obvious, but equally dangerous, hazards.

1. Strainers are debris screens constructed into arroyo channels. The best defense against strainers is to avoid them. If you see a strainer, swim aggressively away from it at a right angle to the

current. If you cannot avoid it, quickly change swimming position. Roll over and swim as fast as possible toward the strainer. Try to hit the strainer with some momentum and pull yourself up onto the strainer. The goal is to, first, avoid being swept under the strainer, and second, to get your body out of the water and away from the force of the current. See Figure 3.

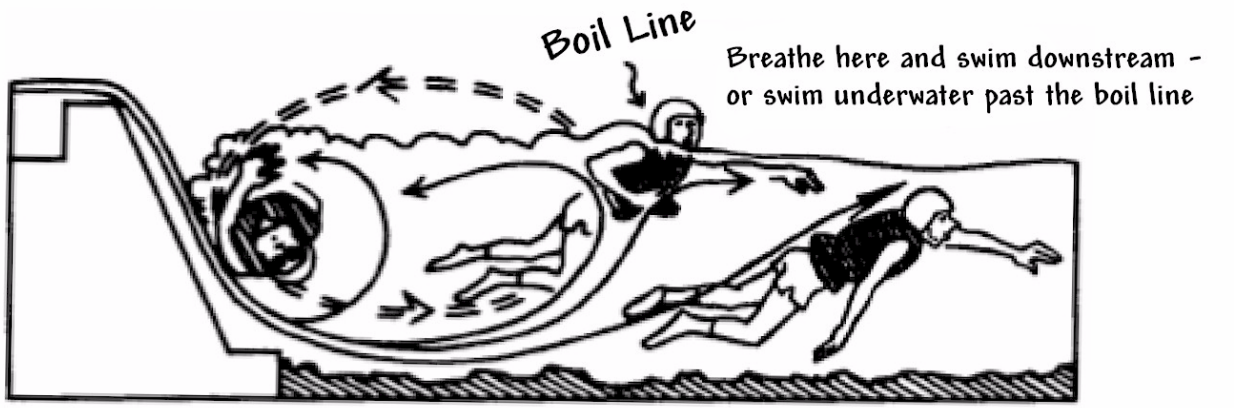
Figure 3



2. Vertical drops are common in arroyo channels. To avoid foot entrapments and extremity injury, pull your knees up against your chest and “ball up” if going over a drop.

3. Low-head dams (also called “hydraulics”) create re-circulating currents that will often hold a swimmer. Escape can be very difficult, and you can swim down stream after surfacing or attempt to catch the downstream current while underneath the water’s surface. See Figure 4.

Figure 4



4. Bridge abutments usually have little in the way of a hydraulic cushion and often collect debris piles that become dangerous strainers. React to bridge abutments by swimming aggressively away from them at a right angle to the current.

5. Stationary underwater debris may leave very little "signature" on the water's surface and may act as a strainer or may snag clothing. React to stationary debris like you would a strainer.

VI. Throw bag system overview

A. More people are probably rescued in slower moving water with throw bags than with any other single method. The flood channel "throw bag system" is inexpensive, lightweight, and simple to deploy.

B. Practice is essential to maintain proficiency. The system is an extended "r*each*" type of water rescue and may be used in any type of water rescue situation.

C. The "throw bag system" works more efficiently with six personnel but can be deployed with as few as four persons.

D. Be prepared for multiple victims. Due to the speed of the current there is probably only one opportunity for the throw bag to reach the victim. If the

victim is not rescued with the throw rope, be prepared to throw him or her a PFD or other flotation device.

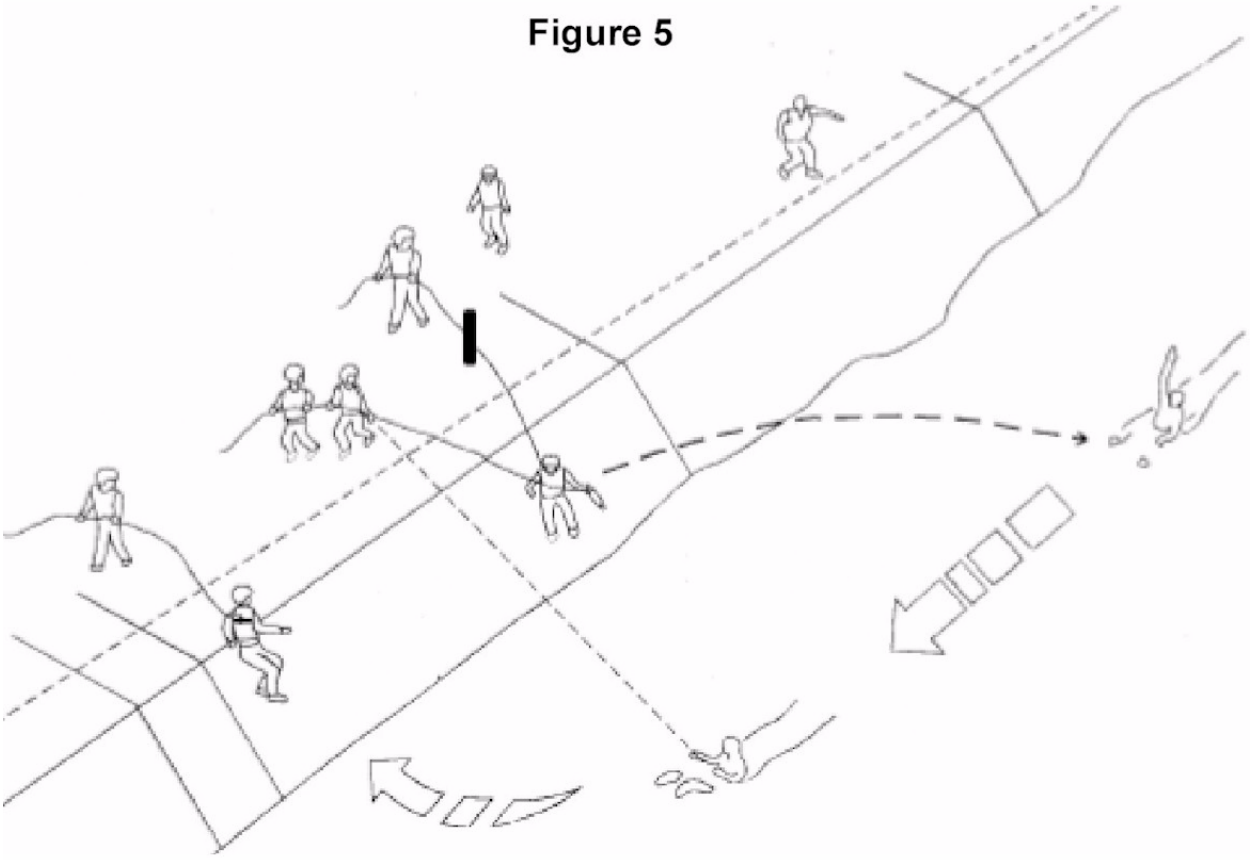
E. Deployment steps are detailed below and are illustrated in Figure 5.

1. Equipment is to be staged near the anchor location on the side of the arroyo.

2. All appropriate PPE is to be donned.

3. Companies will report to respective sector officers for assignment.

Figure 5



VII. Throw bag system deployment

A. Position #1 - Throw bag person.

1. Attach a lifeline to a ladder belt with a Figure-8 knot and/or a carabiner. Hand the lifeline to a belayer.

2. Hand an end of the throw rope to the throw bag belayers. Stage near the waters edge.

3. Position the rope between self and the pickup person. Open the top of the throw bag (may wet the throw bag and rope to increase control).

4. Grasp the bag with one hand and rope with the other. Establish contact with the victim by yelling “rope” or by blowing a whistle to get the victim’s attention.

5. Wait until the victim is closest to you and then throw. When throwing, aim slightly downstream and beyond the victim. Let go of rope when victim grabs rope.

6. Throw bag person and his or her belayer will then exit this area and sets up as an additional pick-up team with the first pick-up team.

7. Provide instruction to the victim as to how to hold onto the rope so that his or her body assumes the correct position.

8. An alternate technique, which may be used in any arroyo where the rope reaches easily from the top of the concrete embankment to the victim, is to have the throw bag person standing on the top, wearing full PPE, but not on belay. They should be prepared to move quickly downstream when the victim grabs the rope, to accommodate the pull on the rope due to the strong current. They should try to estimate the point where the victim will pendulum to the side of the channel, so that the pick-up person/people can get to them.

9. Instructions to the victim should be to pull the rope to their chest, roll over on back and put the rope over the shoulder opposite the bank where the rescuers are positioned. Face downstream with the rope over shoulder, which results in body position at a 45º angle to the current. This body position will cause the water to quickly push the victim to the side of the arroyo.

B. Position #2 – Belayer.

1. Place an anchor strap around anchor and attach a pre-rigged belay device with lifeline to the anchor, using a carabiner. Belay the throw bag person.

2. Keep system slack to a minimum to prevent throw bag person from falling into the water. Belayers should operate on level ground unless tied-off to anchor.

3. Belayer and throw bag person exit this position following rope deployment and set up as an additional pickup team near the first pickup team.

4. Note that all steep flood channels and arroyos require a belay system. Gentle slopes found in some of the flood channels/arroyos may not require a belay.

C. Positions #3 and #4 – Throw bag belayers.

1. Belay victim using throw ropes. Take end of throw bag rope and stands-by for victim contact after the rope is thrown by the throw bag person (Position #1).

2. The throw bag belayer may actually toss the throw bag if utilizing the alternate method described under Position #1 (Throw bag person). Throw Bag Belayers operate on level ground unless tied off to an anchor.

3. After victim makes contact with the rope, the throw bag belayer will provide a dynamic belay by moving downstream with the victim, at the same time allowing the current to pendulum the victim to the side. This action minimizes the shock load on both the throw bag belayer and the victim.

4. Belayers will not wrap or tie the rope to any part of their body.

D. Position #5 - Pickup belayer

1. Place anchor strap around anchor and attach a pre-rigged belay device with lifeline to the anchor with a carabiner.

2. Belay Position #6 (Pickup person). Together, positions 5 and 6 form a pickup team.

3. Keep system slack to a minimum to prevent the pickup person from falling into the water. Belayers operate on level ground unless tied off to an anchor.

E. Position #7 – Pickup person

1. Attach a lifeline to a ladder belt with Figure-8 knot and/or a carabiner. Give the lifeline to pickup belayer.

2. The pickup person(s) stages along the same side as the throw bag person(s), where the victim would be expected to pendulum to the side.
3. The ideal distance between the throw bag person and the pickup team is the approximate length of the throw rope, usually around 75'.

4. Tackle the victim against the flood channel and hold them, head above water, until more assistance arrives.

5. Pull the victim from the water. Secure the victim with a ladder belt and PFD tied off to a rope if possible. Assist them up the side of the channel.

F. Position #7 - Sector Officer

1. Supervise the operations at that rescue site.

2. May fill a dual role and perform another function in one of the above positions.

3. Report to the Incident Commander.

G. Note that all steep flood channels and arroyos require a belay system. Gentle slopes found in some of the channels/arroyos may not require a belay. The “reach” and “throw” methods are the approved ways to effect victim rescue from flood channels, rivers, ditches and arroyos, with special attention given to the throw bag system described above for flood channel rescue.

VIII. Patient care considerations

A. Be prepared for near-drowning, hypothermia, and traumatic injuries.

B. Consider using low-angle rope rescue techniques such as a “ladder slide / litter evacuation” to remove the patient from the bank of the arroyo.

IX. Special rescue site considerations

A. Near Snow Park, response companies may arrive at the same time as the victim passing by. If time permits, deploy a throw bag system, otherwise throw a PFD or flotation device to the victim.

B. Tramway Channel

1. The Kirtland Arroyo system has a unique feature in that the arroyo has eight-foot vertical walls from I-40 to the Kirtland Drain, and limited access due to a fence running the entire length of the arroyo.

2. One location has two low-head dams with eighteen-foot vertical sidewalls. This location, called “The Box,” has been the site of at least one fatality.

3. Rescue from “The Box” should be limited to a modified throw bag system with ground ladders extending into “The Box”.

4. Rescuers should pay close attention to their own safety when inside the fence. Belts should be worn and attached to suitable anchor points before conducting rescue operations.

5. Consider using a Heavy Technical Rescue (HTR) task force for patient packaging and rope rescue systems, along with Bernalillo

County Fire Department (BCFD) or State Police for search operations if needed.

X. Vehicle in the water

A. It not uncommon for a vehicle to be caught in a flood channel, particularly in the far Northeast Heights along Wyoming Boulevard (near Station-20) and in the Four Hills Subdivision (near Station-12). Some roads in these areas still cross through arroyos.

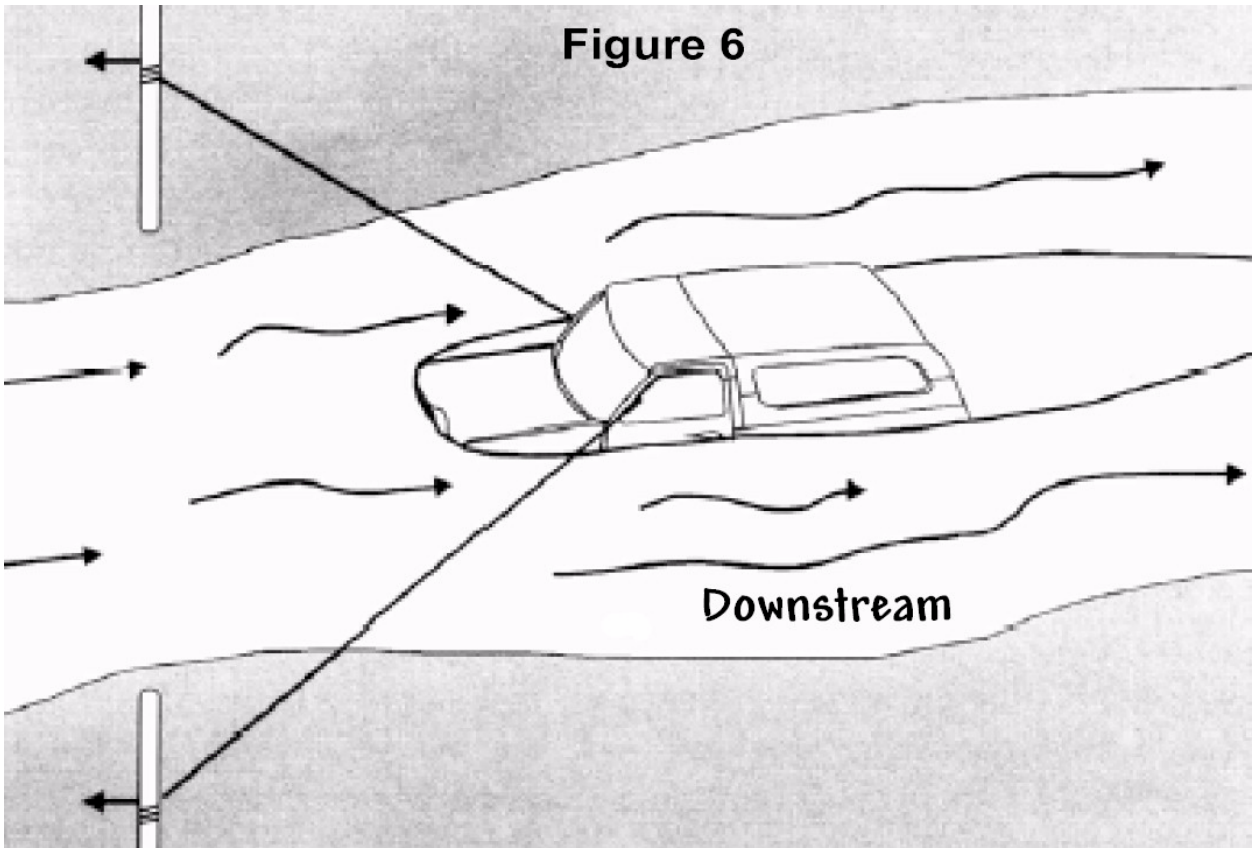
B. Two feet of water will move most vehicles depending upon the velocity of the current, whether or not the vehicle is sideways, and the type of arroyo bottom.

C. A vehicle on a hard surface is more likely to roll or move in the current, whereas on a soft surface, such as sand, the vehicle may sink down onto it's frame and becomes much more stable.

D. Specific rescue elements should be employed whenever there is a report of a vehicle (with trapped victims) in the water.

1. Determine the type of arroyo bottom.

2. Stabilize the vehicle. Attach a winch cable or rope (preferably cable) to keep the car from rolling or moving (any rope used in this fashion should be inspected and downgraded to hoisting use only). This is illustrated by Figure 6.



3. On hard surfaces, instruct the occupants to stay on the upstream side of the car to prevent rolling.

4. Get person flotation devices (PFD) and helmets to the victims prior to attempting any rescue effort.

5. Access the vehicle. Use reaching options, such as ground ladders, aerial devices, or consider approaching the car from the eddy created downstream of it. Be prepared to break windows.

6. Consider removing victims or protecting them in-place. If removing victims, they should have at least a PFD, and should be belayed in some fashion.

XI. HazMat considerations

A. Floodwater may contain toxic chemicals and sewage. Victims, rescuers and equipment should be decontaminated immediately after the rescue event.

B. The extent of decontamination required is situation dependent, but will usually be in the form of a shower for personnel and rinsing equipment with clean water upon returning to quarters.

C. Rescuers exposed to flood channel water may be seen at the City of Albuquerque Employee Health Office for a follow-up evaluation, especially if they have swallowed some water during the event.

XII. Post deployment

A. Following the deployment of any rescue system, the ranking officer of the station during that shift shall ensure that all equipment is inspected, dried, and returned to its designated location at its respective fire station.

B. The ranking officer shall document rope use in the rope log found in or on the flood channel equipment bag.

Swift Water Rescue Operation Plan

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

The purpose of this guideline is to define the measures that should be considered when responding to flood channel or other swift water rescue incidents. They are intended to maximize responder safety, department resources, and victim rescue potential.

Guideline

Swift water rescue usually involves flood channels but may also involve both irrigation ditches and the Rio Grande. Flood control channels were designed to quickly remove rainwater from the city to prevent flooding. Swift water rescue is considered to be the most dangerous type of water rescue. Furthermore, flood channel rescue is considered to be the most dangerous type of swift water rescue.

Shore-based rescues are the preferred method of rescue from flood channels. It is the direction of the Albuquerque Fire Department that flood channel rescue operations be limited to shore-based rescues.

It is the responsibility of all companies assigned near flood channels to become familiar with their assigned rescue sites during flood conditions. It is also advised that companies drill on these rescue techniques on a regular basis, especially during the monsoon season.

Operational Guidance

I. Dispatch considerations

A. Flood channel rescue “Standby Status” notifications

1. The National Weather Service should notify AFD Dispatch, by telephone, of possible flash flood conditions. AFD Dispatch will relay this information to the Albuquerque Police Department, Bernalillo County Sheriff’s Office, and Bernalillo County Fire Department dispatch centers.

2. If not already notified of flash flood conditions, Operations Division battalion commanders and company officers shall notify AFD Dispatch when they notice heavy rainfall or heavy water flow in the arroyos.

3. AFD Dispatch shall notify all stations and units on-the-air of possible flash flood conditions by transmitting the following messages:

    1. "Alarm to all stations and units on-the-air, be advised that potential flash flood conditions may exist for the next _____ hours."

    2. "All companies involved in swift water rescue operations are on a stand-by status and shall confirm their assigned location, review swift water rescue guidelines and inspect equipment as outlined in SOGs."

II. Swift water task forces

A. The Albuquerque Fire Department employs ten fire stations as designated swift water rescue task forces.

1. Fire Station 4 – 301 McKnight NW
2. Fire Station 8 – 1400 Indian View Place NE
3. Fire Station 9- 9601 Menaul NE
4. Fire Station 12 – 201 Muriel NE
5. Fire Station 13 – 4900 Prospect NE
6. Fire Station 15 – 6600 McKinney NE
7. Fire Station 19 – 3520 San Andres NE
8. Fire Station 20 – 7520 Corona NE
9. Fire Station 29 – 501 Bear Canyon NE
10. Squad 2 (from Fire Station 3) – 141 Girard NE

B. All companies that have been include in swift water rescue task forces have been issued throw bags, PPE and belay systems for each apparatus.

C. Company Officers shall ensure that all assigned swift water equipment is placed on the apparatus when placed on “Standby Status.”

D. Battalion Commander-2 shall return to, and remain in, District-2.

III. AFD Dispatch considerations

A. During the 9-1-1 call interview, the dispatcher shall attempt to gain all pertinent information from the caller, in addition those identified in the Fire Priority Dispatch for swift water rescue, 72 Echo 3.

1. Determine what arroyo or channel that the victim is in and at what cross street the victim was last seen.

2. Determine if the victim(s) are moving in the water or are stationary.

B. Strongly consider dispatching a fire company or APD officer to interview first-party witnesses that cannot be readily interviewed by phone.

IV. Dispatch - Victim in the water

A. When a confirmed report of a victim in the water, AFD Dispatch shall make a “swift water rescue dispatch”. AFD Dispatch shall dispatch the appropriate companies based on the location of the Arroyo and this SOG.

B. Appropriate companies shall be notified through the transmission of the following message:

1. “Alarm to (specific companies). Be advised that this is a swift water rescue dispatch. A victim has been seen in the _____ Arroyo/Channel at _____ cross street.”

2. The dispatch will be made by company ID, firebox, grid zone (as outline by this protocol), and any other pertinent incident information.

3. All responding using will be assigned a tactical radio channel.

C. One of the dispatched battalion commanders shall assume command and control of the incident from a base station, or if driving, he or she should pull over and command the incident from their current location.

D. The battalion commander need not be on scene, but shall assume a geographic command over all rescue sites. Driving “code 3” does not allow for adequate communicating, planning, forecasting, or coordinating.

E. At the discretion of the Incident Commander, the next-due battalion commander will respond to the primary rescue site, or to the location of the Incident Commander.

F. All companies shall provide en-route and arrival transmissions via both radio and mobile data terminal (MDT).

G. The Incident Commander shall assign sectors according to the cross street, or by the geographic area where companies are located. For example, Snow Park sector, Morningside sector, North Diversion sector, or Wyoming sector.

H. All sector officers shall inform the Incident Commander when their sector is prepared for rescue operations.

I. AFD Dispatch shall assign a tactical dispatcher to monitor and track all flood channel incidents and coordinate victim spotting with APD Dispatch.

V. Rescue sites

A. The following protocol is to be used to dispatch swift water rescues. The fire boxes provided are for the primary rescue sites.

B. The Incident Commander may divert responding companies and/or sectors to locations further downstream, based on the victim’s last known location.

C. Once a victim passes a rescue site, that sector will stand-down and allow downstream sectors to make the next rescue attempt.

D. Chasing the victim downstream (driving “code 3” to the next cross street and deploying without belays) will not be permitted. Only under extreme circumstances will command deviate from the above guideline.

Embudo Arroyo			
Companies	Location	Fire Box	Grid Zone
E9, R9	Snow Park, Indian School and Parsifal NE	7403	CB240
E13, R13, L13, S3	Embudo @ Morningside NE	7041	BZ211
E4, R4, L4, S1	North Diversion Channel @ Menual NE	7001	BX205
B1, B2, S2			
Includes the following channels / arroyos: 1. Embudito 2. North Glenwood Hills 3. Piedra Lisa 4. Embudo			

Tramway Channel			
Companies	Location	Fire Box	Grid Zone
E12, R12, E8	Tramway Channel along Four Hills Rd NE	7403	CY257
B2, B3, S2			
Includes the following channels / arroyos: 1. Four Hills 2. Kirtland			

Hahn Arroyo			
Companies	Location	Fire Box	Grid Zone
E19, QI-78	Hahn @ Carlisle NE	7013	BN208
E29, R29	North Diversion Channel @ I-25 NE, along Chappell NE	6063	BH208
B1, B2, S2			
Includes the Julie Channel			

Grantline Channel			
Companies	Location	Fire Box	Grid Zone
E19, QI-78	Grantline Channel @ Carlisle NE	7051	BJ209
E29, R29	North Diversion Channel @ I-25, along Chappell NE	6063	BH208
B1, B2, S2			

Bear Canyon Arroyo			
Companies	Location	Fire Box	Grid Zone
E15, R15, L15	Arroyo Del Oso Park, Bear Canyon Arroyo west of Wyoming along Spain NE	7103	BH230
E29, R29	North Diversion Channel @ south of Osuna, along Chappell NE	6063	AZ208
B1, B2, S2			
Includes the Bear Tributaries			

Borealis Arroyo			
Companies	Location	Fire Box	Grid Zone
E15, R15, L15	Borealis Arroyo @ Pan American East NE	7151	AZ217
E29, R29	North Diversion Channel, north of Osuna NE	6045	AV208
B1, B2, S2			
Note: Drains into the Pino Arroyo			

Pino Arroyo			
Companies	Location	Fire Box	Grid Zone
E15, R15, L15	Pino Arroyo @ Wyoming	7157	AW220
E29, R29	North Diversion Channel, north of Osuna NE	6045	AV208
B1, B2, S2			

North Pino Arroyo			
Companies	Location	Fire Box	Grid Zone
E20	North Pino Arroyo @ Wyoming	7115	AV228
E29, R29	North Diversion Channel, south of Paseo del Norte Frontage Rd. NE	6055	AT208
B1, B2, S2			

Domingo Baca Arroyo			
Companies	Location	Fire Box	Grid Zone
E20	Domingo Baca Arroyo @ Wyoming	7114	AP228
E29, R29	North Diversion Channel, north of Paseo del Norte, Balloon Fiesta Park	6522	AL208

B1, B2, S2	

North Domingo Baca Arroyo			
Companies	Location	Fire Box	Grid Zone
E20	North Domingo Baca Arroyo @ Wyoming	7204	AL228
B2, S2			
Note: Drains into Domingo Baca Dam, located east of Louisiana			

La Cueva - Norestates Channel			
Companies	Location	Fire Box	Grid Zone
E20	La Cueva - Norestates Channel @ Woming NE	7203	AH228
E29, R29	North Diversion Channel, north of Alameda Rd NE	6514	AC210
B1, B2, S2			

VI. North Diversion Channel access

A. Engine-29, Rescue-29, Battalion-1, Battalion-2, and Squad-2 have been issued keys from AMAFCA to access the service roads along the North Diversion Channel.

VII. Squad-2, Heavy Rescue responsibilities

A. Squad-2 will act as the Incident Commander's tactical reserve, and will be deployed as determined by the Incident Commander - based on incident priorities.

VIII. APD roles and responsibilities

A. The Albuquerque Police Department's role in swift water rescue will be limited to spotting victim(s) location, scene control, and deploying flotation tubes.

B. The AFD Incident Commander shall contact APD on the “Metro” talk group and switch to the “APD_NE” channel.

C. The AFD Incident Commander will Inform APD of all incident details, as currently known, and will request the APD officer-in-charge to coordinate the spotting locations as determined by command. It is imperative that APD provide timely information to the AFD Incident Commander.

IX. Vehicle in the water - dispatch protocol

A. In addition to previously detailed protocols, AFD Dispatch will dispatch additional resources.

1. Ladder company

2. Squad-2 (Heavy Rescue)

3. Tow truck and/or wrecker

X. Stand down or termination of rescue operations

A. If no victims have been encountered at any rescue sites, or if there have been no new reports of “victim(s) in the water,” and a reasonable period of time has elapsed since the most recent report, companies may “stand-down” and return to service.

B. “Stand-down” shall be at the direction of the Incident Commander.

XI. Post-deployment

A. Following deployment, company officers shall ensure that all equipment is inspected, dried, and returned to its designated location.

B. The ranking officer is responsible for documenting rope use in the rope log.

Vehicle Extrication

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

The purpose of this guideline is to establish Albuquerque Fire Department's operational methods for vehicle extrication and to maximize operational effectiveness and patient care, while providing for rescuer safety.

Guideline

This guideline applies to all emergency incidents where a person(s) is trapped or pinned in, under, or in-between vehicles. Rescuers may be faced with many combinations of vehicle extrication scenarios, which could include one or more patients. Since the different scenarios are endless, this guideline will focus on general operational methods and precautions. It is the responsibility of all AFD personnel to become familiar with extrication equipment carried on engine and rescue companies, and with the capabilities of Squad 2 (Heavy Rescue). The basis of this guideline was obtained from NFPA 1670: Standard on Operations and Training for Technical Search and Rescue Incidents.

Operational Guidance

I. Scene size-up

A. Upon arrival, the first-arriving company officer will assume command, provide an appropriate size-up, acquire a tactical channel through AFD Dispatch, and initiate specific measures that include the following.

1. Request additional resources if appropriate.

2. Medical Priority Dispatch (MPDS) shall guide dispatch for vehicle accidents.

   a. The MPDS codes are the 29 card series.

   b. If a person(s) is found to be trapped or pinned, the first arriving company shall request Squad 2-Heavy Rescue and Battalion 2.

3. Determine the need for a hazardous materials response.

4. Determine the need for APD to provide for traffic and crowd control.

5. Contact PNM if there are any downed power lines.

6. Conduct a 360° scene survey.

7. Identify all involved vehicles.

8. Identify all potential hazards.

9. Establish hazard zones; restrict entry to only those who have a need to be within the hot zone.

10. Determine the number of victims.

    a. Determine the need for additional transport ambulances.

    b. Initiate the multi-casualty incident (MCI) process, if appropriate.

11. Use triage methodology to determine the general condition of patient(s).

12. Develop and communicate an “Incident Action Plan” (IAP).

13. Establish the necessary sectors.

    a. Rescue and extrication.

    b. Safety.

    c. EMS: triage, treatment, and transport.

    d. HazMat.

    e. Public Information.

    f. Law enforcement.

II. Hazard identification

A. The Incident Commander should identify as many potential hazards as may be found within the incident purview, and ensure that responders take preventive measures to guard against injury. Common hazards that may be encountered during an extrication operation include the following:

1. Traffic. Ensure traffic control measures are employed.

2. Electrical.

   a. Determine if utilities, such as downed power lines, are involved.

   b. Disconnect vehicle battery(ies). More than one may be found, and they may be in different locations than normally found.

   c. Hybrid or electrical vehicles have large high voltage batteries; their corresponding wires are usually orange in color.

   d. Consider moving electric seats back before disconnecting the battery(ies).

3. Vehicle hazards.

   a. Leaking vehicle fluids will require control measures to prevent fire and to protect the environment.

   b. Secure any doors or roof flaps to prevent them from swinging back and striking a rescuer or patient.

c. Any lifting operation must be accompanied by immediate cribbing of the object lifted.

d. Energy absorbing bumpers may be damaged and compressed. Do not approach the vehicle from the front.

e. High pressure struts that support the hood, trunk lid, rear hatch, or rear glass are another danger that should be noted, especially if exposed to fire or the structure that they are connected to is damaged.

III. Supplemental restraint systems (SRS)

A. The supplemental restraint systems in passenger vehicles may include airbags, side air curtains, and seatbelt tensioners, especially in newer models.

1. Determine which SRS have deployed and which ones have not.

a. Be cautious of any intact airbags.

b. Intact airbags have the potential to deploy with an explosive force and can cause severe injuries to the rescuers and/or patient.

2. Newer vehicles have multiple SRS through out the vehicle, such as in the upper and/or lower dash, seat bolster, side curtain, seatbelt tensioners, and in and/or below the steering wheel.

3. Disconnecting the battery(ies).

a. Disconnecting the battery(ies) does not immediately disable the SRS controllers.

b. There are multiple capacitors in the vehicle that can store energy for up to 12 minutes.

c. Pull back interior plastic panels; attempt to locate the wiring and controllers so they can be moved out of the way of any cutting operations.

4. SRS wiring.

   a. Cutting SRS wiring may cause deployment of the SRS.

   b. The wiring that carries the electrical power for the SRS can usually be identified by its bright yellow color.

   c. Actuators can be found in the A, B, and C posts, and in the bottom door sills.

   d. Controllers can be found in the front kick panels; these parts can be unbolted and moved out of the way

IV. Scene safety

A. The Incident Commander or company officer is responsible for ensuring that the operational scene is safe for all responding personnel.

   1. The apparatus should be positioned is such a manner as to protect the scene from oncoming traffic.

   2. All personnel should try to exit the apparatus on the side away from oncoming traffic.

   3. Identify damaged any utilities and initiate control measures.

   4. Establish safety zones.

      a. The hot zone consists of a ten-foot circle around the vehicle, and requires full PPE use by all personnel.

      b. The warm zone consists of an area ten-to-fifteen feet in all directions from the vehicle, is used for tool staging, and requires full PPE by all personnel.

      c. The cool zone is located outside of the warm zone; personnel may use reduced levels of PPE, or may be unprotected.

V. Personal protective equipment (PPE)

A. Rescuer PPE includes head, eye, ear, hand, foot, and skin protection.

B. Universal precautions may apply.

VI. Rescue operations

A. Perform an “outer circle” survey for each vehicle.

1. Locate all patients.

   a. Consider using the Thermal Imaging Camera to located ejected victims.

   b. Determine the best access route to the patient location.

2. Conduct an “inner circle” survey.

   a. Turn off the vehicle ignition, if possible.

   b. Make patient contact and establish their condition.

   c. Determine how the patient is pinned or trapped.

3. Develop and communicate the “Extrication Plan”

4. Control hazards.

   a. Disconnect battery(ies). Remember that doing so may deactivate the Supplemental Restraint System.

5. Provide for fire protection.

   a. Use a 1¾” attack line at the minimum.

   b. Consider using either foam or micro-blaze for vapor suppression.

6. Evaluate the integrity and stability of the vehicle(s).

a. The goal in stabilizing the vehicle is to prevent any vehicular movement by employing a combination of step chocks, cribbing, wedges, tire deflation and/or deployment of the Vehicle Stabilization Kit carried on Squad 2.

b. Consider using winches from squads, commander's vehicles or tow trucks.

7. Gain patient access.

a. Protect the patient from harm by using blankets, tarps, backboards, safety glasses, and a helmet.

b. Stabilize the patient's medical condition while performing the extrication, if appropriate.

8. Use appropriate extrication techniques to free the patient from the vehicle.

a. Make an access point.

b. Create a patient removal point.

9. Displace or remove vehicle components.

a. Remove glass.

b. Flap or remove the roof.
c. Displace or remove the door(s).

d. Lift or displace the dash.

e. Perform a total side removal.

f. Remove or displace the steering wheel and/or pedals.

VII. Tools of the trade

A. Hand tools include the following:

1. Hammers, pry bars, saws, cable cutters, come-a-long, chains, wrenches, socket sets, high-lift jacks.

2. Simple machines include inclined planes (wedges), and levers (pry bars).

3. Pneumatic devices include air bags, pneumatic chisels and/or air guns.

4. Power tools include drills and hydraulic tools, such as rams, spreaders, and cutters.

5. Cutting tools include saws, torches, and grinders.

VIII. Termination of operations

A. Upon determining the termination of operations, the Incident Commander should perform or consider the following measures:

1. Obtain a personal accountability report (PAR) from all sectors.

2. Inventory and return all equipment to the appropriate apparatus or storage location.

3. Place damaged equipment out-of-service and notify one of the Heavy Rescue Commanders for a repair order/replacement authorization.

4. Decontaminate personnel and equipment as needed.

5. Coordinate termination of the incident with the law enforcement sector.

6. Consider the need for a Critical Incident Stress Debriefing (CISD).

7. Provide a tailboard critique and consider a formal debriefing at a later date and time.

Confined Space Rescue

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

The purpose of this guideline is to establish the Albuquerque Fire Department's operational methods for addressing confined space rescue operations. These guidelines are intended to maximize operational effectiveness, patient survivability, and rescuer safety.

Guideline

This guideline applies to the entry of "confined spaces" by AFD personnel for the purpose of rescue/recovery operations. The basis of this guideline is NFPA 1670: Standard on Operations and Training for Technical Search and Rescue Incidents and OSHA 29 CFR 1910.146: Permit-Required Confined Spaces.

OSHA rule "29 CFR 1910.146 Permit-Required Confined Spaces" requires a variety of health and safety provisions, one of which is mandatory training for everyone who may perform confined space rescue. This guideline does not, in any way, waive or supersede the provisions of 29 CFR 1910.146, or the good judgment of Confined Space Rescue Technicians. It is the responsibility of all command and company officers to familiarize themselves with the methods described in this operational guide.

Operational Guidance

I. Definitions

A. An NFPA-defined "confined space" meets specific criteria:

1. It is large enough and so configured that a person can bodily enter.

2. It has limited or restricted means for entry or exit.

3. It is not designed for continuous occupancy.

B. A "permit-required confined space (permit space)" is a confined space that has one or more of the following characteristics:

1. It contains or has a potential to contain a hazardous atmosphere.

2. It contains a material that has the potential for engulfment.

3. It has an internal configuration that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross section.

4. It contains any other recognized serious safety or health hazard.

C. The term "non-permit required confined space" means a confined space that does not contain or, with respect to atmospheric hazards, have a potential to contain any hazard capable of causing death or serious physical harm.

D. **Confined space scenarios include**:

1. Storm drains and sewers.

2. Underground vaults.

3. Above or below ground storage tanks.

4. Trenches and tunnels.

5. Transportation vessels.

6. Silos.

7. Machinery rooms and product lines.

8. Air handling units.

II. Command considerations

A. Scene size-up.

1. Upon arrival, assume command, provide size-up, and acquire a tactical radio channel.

2. Request a Heavy Rescue response, if one has not already been dispatched.

3. Command should attempt to secure a company representative or witness to the event to determine what happened.

a. Obtain and review an entry permit, if available.

4. Assess actual and potential hazards.

5. Attempt to make patient contact (voice).

6. Determine the number of victims.

7. Determine down time of the victim(s), the mechanism of injury, and the survivability profile of the victim.

8. Determine the mode of operation.

a. Rescue or Recovery.

B. Evaluate the confined space.

1. Determine the confined space type.

2. Determine what products and/or hazardous materials are stored in the space.

3. Determine all known hazards present in and around the space.

4. Obtain a diagram, blueprint, or sketch of the confined space, including entry and egress locations.

5. Determine the victim(s) location.

6. Determine the structural stability of the confined space.

C. Manpower considerations.

1. Assess the need for additional Rescue Technicians.

2. Ensure that HazMat personnel are present to perform hazardous materials evaluation, provide PPE recommendations, and atmospheric monitoring.

3. Ensure for personnel accountability.

4. Assess the need **for Rehab and** crew rotation.

5. Ensure that all needed equipment is on-scene.

D. Designate Sectors as needed.

1. Safety.

2. Rescue (entry, rigging, air supply).

3. Rapid Intervention Team.

4. HazMat (research, PPE recommendations and atmospheric monitoring).

5. EMS (treatment and transport).

6. Rehab.

7. Welfare (for victim's family).

8. Industry Liaison.

9. Public Information.

III. Pre-entry operations

A. Make the area around the confined space safe.

1. Establish hazard zones and entry control. Restrict entry to only those who have a need to be within the general area.

2. Control ignition sources.

3. Establish ventilation to the area outside the confined space if needed.

4. Control any hazards in the general area.

5. Consider the location of combustion engines and its exhaust.

B. Make the confined space safe.

C. Atmospheric monitoring.

1. Conduct atmospheric monitoring of the internal atmosphere (of the confined space) with a direct reading atmospheric monitor for oxygen, flammability and toxicity.

2. Atmospheric monitoring shall occur prior to and during entry operations.

3. The atmospheric monitor shall be zeroed and calibrated, using the manufacturer's calibration gas, in a clean environment prior to sampling the internal atmosphere.

4. The following levels shall be considered Immediately Dangerous to Life and Health: (IDLH):

   a. Oxygen deficient < 19.5%.

   b. Oxygen enriched >23.5%.

   c. Flammable gas, vapor, or mist in excess of 10 percent of its lower explosive limit. (LEL).

   d. Toxicity shall be defined as any limit that exceeds the Permissible Exposure Limit (PEL) for any particular substance.

   e. Airborne combustible dust at a concentration that meets or exceeds its Lower Explosive Limit. (LEL).

i. This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet or less.

5. If an IDLH atmosphere is present, action should be taken to reduce the atmospheric hazard or use an appropriate level of respiratory protection.

6. Results of atmospheric monitoring should be documented at least every fifteen minutes on the entry work sheet/check list.

IV. Ventilation considerations

A. Develop a ventilation strategy.

B. Consider positive pressure ventilation if there is more than one opening to the space.

C. Consider negative pressure ventilation with ductwork if there is only one opening to the space.

D. Consider the vapor density of the product stored within the space.

E. Ventilation exhaust should be directed to a safe area.

F. Fans powered by internal combustion engines are not to be used.

G. Consider if any ventilation will pull product through its flammable range.

H. If atmospheric conditions are determined to be unsafe, despite PPE protection, entry operations will be terminated until such time that the atmospheric conditions are corrected.

V. Isolation (lockout / tagout) considerations

A. Isolate the confined space from the release of hazardous energy.

B. All energy sources need to be brought to a zero mechanical state.

1. These include, but are not limited to the following:

   a. Mechanical.

   b. Electrical.

   c. Hydraulic.

   d. Pneumatic.

   e. Steam.

   f. Movable liquid and finely divided particles.

C. All electrical and mechanical equipment should be secured using appropriate lockout/tag out procedures according to OSHA 29 CFR 1910.147.

VI. Entry operations

A. When deploying personnel, consider specific assignment criteria.

1. Only current Confined Space Rescue Technicians are to be designated as entrants.

2. Assign a Rapid Intervention Team.

3. Entry teams should be rotated every thirty minutes.

4. The HazMat Specialists should recommend chemical Personal Protective Equipment requirements.

VII. Incident Action Plan

A. Prior to entry, all sectors are to be briefed on the incident action plan (IAP).

B. Each briefing should include specific criteria.

1. Roles and responsibilities.

2. Rescue plan of action

   a. Along with a back-up plan.

3. Any known hazards.

4. Required personal protective equipment (PPE).

5. Atmospheric monitoring results.

6. Product particulars.

7. Communication methods.

8. Isolation considerations.

VIII. Post-entry considerations

A. Upon victim removal.

1. Transfer the victim to paramedics for an ALS level examination and treatment.

2. Gross decontamination should be provided prior to transport, if the victim is contaminated with product.

3. The Material Safety Data Sheet (MSDS) should be made available to the receiving hospital.

IX. Termination of operations

A. Obtain a personal accountability report (PAR) from all sectors.

B. Inventory and return all equipment to the appropriate apparatus.

C. Place damaged equipment out-of-service and notify one of the Heavy Rescue Commanders for a repair order/replacement authorization.

D. Decontaminate personnel and equipment as needed.

E. Secure the confined space by having the contractor or company representative seal entry points to prevent unauthorized entry.

F. Consider the need for a Critical Incident Stress Debriefing (CISD).

G. Provide a tailboard critique and consider a formal debriefing at a later date and time.

Elevator Operations

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

The purpose of this guideline is to establish the Albuquerque Fire Department's safety protocol and to define the operations needed for the rescue and removal of individuals trapped in elevators.

Guideline

This guideline shall be followed whenever mitigating elevator emergencies. Adherence to this guideline will maximize both firefighter and elevator passenger safety while minimizing damage to the elevator system.

Operational Guidance

I. Elevator construction

A. Elevators systems are complex electrical systems. The mechanical aspects of elevator construction, however, are fairly simple and easy to understand. Rescuers must have a good understanding of elevator construction in order to perform rescue operations safely.

B. There are two basic types of elevator systems: hydraulic and electric traction.

1. Hydraulic elevator systems consist of a hydraulic fluid reservoir, pump, lift cylinder and elevator car. As fluid is pumped into the lift cylinder, the car elevates. As fluid returns to the reservoir, the car lowers. These systems are limited to seven stories of vertical travel.

2. Electric traction elevators consist of a series of cables that travel over a traction sheave and are connected to the elevator car on one end and counterweights on the other end. An electric motor spins the traction sheave. Based on the rotation of the traction sheave, the elevator car is raised or lowered. Travel distances for these cars are only limited by the lengths of the cables.

C. Elevator systems will have a machine room the houses the motors/pumps and electrical systems for car operations.

1. The machine room for a hydraulic elevator system is usually found at the lowest level of the building.

2. The machine rooms for electric traction systems are commonly found above the elevator cars either on the roof or within a penthouse.

3. Identifying the type of elevator system and the location of the machine room is critical before any intervention in an elevator incident can begin.

II. Dispatch

A. The majority of calls that involve elevators are incidents involving a person or persons simply stuck in the elevator. These incidents do not require techniques that damage elevator systems.

B. An emergency exists under three conditions.

1. Fire.

2. Illness or injury.

3. Panic.

C. If the elevator system is involved in fire, a passenger is sick/hurt, or if a passenger is a danger to himself or others, an emergency exists.

D. Any operations that may damage an elevator system are acceptable only under emergency conditions.

III. Size-up

A. Firefighters must determine several things in order to determine if the event is either an incident or an emergency. Size up will answer many of these questions.

1. Is the car operable?

2. Are people trapped? If so, what is their condition?

3. What type of system is involved?

4. What is the location of the elevator car and machine room?

5. Has an elevator mechanic been dispatched?

   a. If not, one should be requested.

   b. If so, what is the estimated arrival time?

IV. Firefighter intervention

A. Once the size-up has identified that either removal or rescue is needed, firefighters may initiate several actions to remove passengers from the elevator car.

   1. Communications must be established with the passengers.

   2. The condition of all passengers must be assessed. They should be kept informed of all actions being undertaken to ensure their safe removal.

B. If the size-up has determined that this is an incident requiring firefighter intervention, rescuers may employ the following techniques. These are listed in the order in which they should be performed.

   1. Passenger self-removal.

      a. Passengers may be able to open the car doors by pressing the “door open” button located on the panel inside the car. If this is unsuccessful, a radio-equipped firefighter must be sent to the machine room to shut off power to the elevator system.

      b. Power should be shut off for a minimum of thirty seconds, then restored. This gives the electrical relays an opportunity to reset. With power restored, have the passenger attempt the “door open” button again. If again unsuccessful, have the firefighter assigned to the machine room again shut off the power. If the power can be locked-out/tagged-out, the firefighter may return to assist with other operations. If the power cannot be locked-out/tagged-out, the firefighter must remain in the machine room to ensure power to the elevator system remains de-energized and in fire department control.

2. Elevator recall

   a. Elevators may need to be recalled.

   b. The elevator car may be recalled using the Phase I feature.

3. Elevator keys

   a. Hoistway doors are required to have a keyhole located, at a minimum, on the lowest and highest floors serviced by the elevator. Many elevator systems have a keyhole located on every floor.

   b. At many buildings, security personnel and maintenance personnel will know the location of an onsite elevator key. Insert the key and attempt to open the hoistway door.

   c. Ladder companies and Squad 2 carry complete elevator key sets.

4. Horizontal poling

   a. If the elevator system has a multiple hoistway, horizontal poling may be attempted. A multiple hoistway has two or more cars traveling within the same hoistway. An operating car is positioned next to the inoperative car.

   b. While standing in the repositioned car, a pike pole is used to open the hoistway door in front of the inoperative car.

C. If these techniques are unsuccessful, firefighters are to await the arrival of an elevator mechanic. Any other attempts to open the doors will result in unjustified damage to the elevator system. It is very important that the passengers be continuously reassured and updated about the progress of their situation.

D. Under emergency conditions, there are other techniques that can be performed.

   1. These include wedging, air bags and hydraulic power plants.

2. These operations are intended to spread the hoistway doors apart and break the interlock that keeps the hoistway doors closed.
3. These techniques are dangerous for both passengers and firefighters and are only to be performed under emergency conditions (fire, illness/injury, panic).

V. Safety

A. Elevator rescue operations can be hazardous. Hazards include pinching, crushing, electrical and falling. The importance of safe practices cannot be overstated when performing elevator operations.

B. In order to maximize safe operations, levels of firefighter intervention need to be defined.

1. All firefighters may attempt elevator recall, elevator key use and horizontal poling. These are considered basic elevator incident operations.

VI. Emergency operations

A. Only Rescue Technicians (Heavy Technical Rescue Personnel) that have received advanced training in elevator rescue may perform operations that require entry into the elevator hoistway.

B. Operations that involve working within hoistways, beside, above or below the elevator car, are special operations that require fall protection using full body harnesses and rope systems, and a more thorough understanding of elevator components and systems.

C. Tactical questions

1. Is there an inoperative elevator, and are people inside?

2. Has communication been established with the passengers, what is their condition?

3. Is a mechanic en route?

4. What type of system is involved?

5. Where is the car and the machine room?

D. Tactical operations

1. Position a firefighter in machine room and at the identified floor.

2. Establish communication with trapped passengers and the machine room firefighter.

3. For a passenger-assisted rescue

   a. Have them depress the “door open” button.

   b. Have them attempt to open car doors manually.

4. For a rescue requiring firefighter intervention

   a. Shut off power to car for minimum of thirty seconds; reestablish power; attempt “door open” button again.

   b. If unsuccessful, attempt to recall the elevator.

   c. If still unsuccessful, shut off power again, lock-out/tag-out or keep a firefighter in the machine room.

   d. In a hydraulic system, the restrictor valve can be operated.

E. Using keys or horizontal poling

1. An emergency exists only if a passenger is ill or injured; if passenger is panicked and has become a danger to himself or others; or a fire condition exists.

2. Enter the hoistway.

3. Access the top hatch.

4. Access the side door.

5. Forcible entry methods include:

   a. Wedging.

   b. Air bags.

   c. Rabbit tools.

   d. Hydraulic spreader.

Trench Rescue

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

This purpose of this guideline is to establish the Albuquerque Fire Department's guidelines for trench rescues. It identifies accepted operational tactics for safety and efficiency in the resolution of trench emergencies.

Guideline

As an all-risk capable department, it is the direction of the Albuquerque Fire Department to provide for special operations involving technical rescues. Trench and excavation incidents are "Low Frequency, High Hazard" rescues. Such rescues usually involve a dynamic environment that is physically and mentally challenging due to the duration of the event and an unpredictable environment. It is the responsibility of all personnel to understand the guidelines for trench rescue operations. It is additionally the responsibility of all command officers to understand the structure for trench rescue command-and-control.

Operational Guidance

I. Dispatch considerations

A. If the caller's information indicates a trench/excavation collapse with a victim(s) trapped or EMS incident within a trench without a collapse, the following shall be dispatched:

1. Closest engine and rescue companies

2. Heavy Rescue Task Force

4. Squad 2

5. Battalion 2

II. Scene safety

A. All personnel on scene must don helmets, gloves, steel-toes boots, long pants or coveralls, and eye protection.

B. First- in companies shall stage no closer than 150' due to the potential for secondary collaps.

C. First-in unit officer has Command and Accountability and is responsible for scene safety.

D. Under no circumstances shall emergency responders enter a unprotected trench to provide patient care or extrication operations until a protective system is installed. Order any personnel in an unprotected trench to exit immediately. A failed trench wall has high probability of secondary collapse.

E. Reconnaissance shall be done by officers to minimize the number of personnel near the lip of the trench.

F. When approaching the trench use extreme caution. Always approach the trench from the short edge. The trench is weakest along its long edge and strongest along its short edge.

G. Other personnel should begin removing equipment from the HTR Squads to an equipment staging area in preparation for the rescue operatio. If a viable patient is present, Command should organize the rapid placement of shoring panels to protect the patient from secondary collapse.

III. Command responsibilities

A. Establish a strong, visible Command and designate the following accountabilities:

1. Safety – must be trained in Trench Rescue

2. Rescue – consists of a panel team, a shoring/extrication entry team, equipment staging team, and strut team

3. Apparatus staging

4. EMS – patient care

5. Haz Mat – atmospheric monitoring

6. Rehab – responder rehab and Red Cross

7, PIO

8. Welfare – provide support to family members and coworkers

9. Liaison – heavy equipment operators, OSHA

10. Law enforcement – scene control

B. Create hazard zones

1. Hot Zone: 0-50'. No apparatus except Heavy Rescue is permitted in this zone.

2. Warm Zone: 50-100'. Command and equipment staging shall be established in this area.

3. Cold Zone: 100-150'. Personnel staging, welfare, PIO, and responder rehab.

4. All operational zones should be cordoned off with fire line tape. All unauthorized personnel is remain outside the cold zone.

C, Perform size-up

1. Size-up is done to develop a plan of action based on safe working conditions and available resources. Utilizing observation of the scene and interview of informed individuals (e.g., worksite foreman), determine the following:

a. Who is in charge and what happened?

b. What is the nature of the incident?

c. Collapse, entrapment, medical emergency

d. How many victims?

e. What was their last known location?

f. What were the original dimensions of the trench? (width, length, and depth)

g. What is the scope of work being done before the trench collapse?

h. Are there any other hazards?

D, Risk management

1. Command must perform risk assessment and determine whether the operation is a rescue or recovery based on the following criteria:

a. Is the patient partially or completely covered?

b. How much soil is covering victims?

c. Down time? Victims experience biological death in 4-6 minutes if completely buried.

d. Can the risk to rescuers be minimized to an acceptable level?

e. Capabilities of on-scene resources and availability of additional/community resources

IV. Rescue operations

A. Make the general area safe

1. Eliminate all sources of vibration within 300 feet of the trench.

2. Consider establishing a “no fly” zone by contacting the FAA.

3. Control the scene. Direct non-essential personnel to remain outside the cold zone.

B. Make the trench lip safe

1. Install a straight ladder into the trench.

2. Place ground pads along the edge of the trench using 2' x 8' plywood sheets or 2’ x 10’ planks.

3. Move the spoil pile at least 2 feet away from the lip of the trench.

C. Make the trench safe

1. Monitor the atmosphere and ventilate if necessary.

2. Support any utilities that intersect the trench.

3. Remove tripping hazards.

4. Remove water from the trench, if necessary.

D. Stabilize the trench

1. Install an appropriate protective system for the type of collapse encountered.

2. Consider the following protective system options:

   a. Shore area around the victim

   b. Install a whaler system to span the collapsed area.

   c. Use air bags to fill voids

   d. Install a trench box

3. Slope the trench face away from the victim only after outlining the original trench perimeter with tape.

4. Never use heavy equipment to dig in the original trench area.

5. Shoring installation

   a. Install shoring panels followed by cross braces.

b. Shore from top to bottom or as dictated by the type of collapse.

c. Rescuers shall not enter the trench more than waist deep when installing the first cross brace. Rescuer then proceeds down the ladder to the height of the installed cross brace and assists with the installation of the next cross brace. Rescuers must always work from within an area protected by the protective system when installing subsequent shoring panels and cross braces.

d. Cross braces should not be closer than 1' from the top of the trench and no lower than 2 feet from the bottom of the upright/sheeting. (Follow Paratech's Manufacturer's Tabulated data or use the tabulated data found in 29 CFR 1926, Subpart P, Excavations.)

e. If using 4" x 4" Douglas Fir cross braces as "Temporary Emergency Shoring" space cross braces 2' vertical and 4' horizontal.

E. Extricate the patient

1. Upon patient contact treat only life threatening conditions and support ABC's.

2. Partially buried patients must have soil removed from around their chest to alleviate respiratory distress.

3. If prolonged extrication is expected, consider ALS intervention and MCEP (Medical Control Emergency Physician) for the treatment of crush syndrome prior to the removal of compressive force.

4. Patients must be completely uncovered prior to extrication attempts.

5. Shovels and hand trowels can be used to remove the bulk of the soil.

6. Once rescuers gain immediate access to the patient, hand digging may be required to avoid further injury to patient.

7. Use rated collapsible buckets to remove soil from trench. Do not raise and lower buckets directly over patient or rescuers.

8. No more than 2' of unshored area can exist below the protective system. Add supplemental shoring as necessary.

9. Rotate crews as necessary.

10. Once the patient is completely uncovered, package the patient for removal from the trench in the appropriate device (e.g., Stokes).

11. Full spinal immobilization is recommended but may not be possible.

F. Remove the patient from the trench appropriate techniques.

1. Ladder slide - slide Stokes up a ladder by use of a 2:1 mechanical advantage rope system, or consider the use of

2. An aerial ladder or crane to establish an overhead anchor point and construct a rope system. Never use cranes or aerials to lift the patient out of the trench.

G. Once the patient is on the surface, transfer care to the EMS Sector for further ALS examination, treatment and transport. Consider using LifeGuard (establish an appropriate landing zone a safe distance from the trench).

V. Event termination

A. Removal of protective system

1. Regroup all rescuers and develop a plan for removal of the protective system. Removal is an extremely hazardous phase of the operation due to the high potential for secondary collapse. If

conditions are judged to be unstable, leave the shoring in place. It is not worth a rescuer's life to retrieve equipment.

2. Remove shoring in reverse order of installation: Last shore in is the first shore out.

3. Inventory, inspect and return all equipment to the appropriate apparatus. Squad 2 Officer will place any damaged equipment out of service and make arrangements for repairs or replacement.

B. Return the scene to a responsible party. Consider backfilling the excavation if no responsible party is available and the trench area cannot be secured.

C. Conduct a operations critique at the appropriate time. Consider the need for Critical Incident Stress Debriefing (CISD).

Rope Rescue

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

The purpose of this guideline is to establish the Albuquerque Fire Department's operational methods for conducting rope rescue operations, and the evacuation of trapped or injured persons from specific elevated or sub-grade areas, while providing for rescuer safety. Because of the infinite number of situations and environments (structural, confined space, wilderness) that could be encountered, this guideline will not define a specific evolution or technique to use, but rather, will provide general guidelines to follow for conducting safe and effective operations.

Guideline

This guideline applies to emergency incidents where a person(s) is in need of assistance in an elevated or sub-grade area where fall protection is appropriate. Fall protection is appropriate when the victim can fall from a height greater than one story, or needs to be lowered or raised to safety in a patient packaging device (such as a stokes basket). It defines size-up, response modes, and command structures that may be appropriate for rope rescue operations.

It also describes hazards that may be encountered on such operations, and the protective measures that should be employed to ensure AFD responder safety. It is the responsibility of all command and company officer to be familiar with the employment of this operational guide. The basis of this guideline was obtained from NFPA 1670: Standard on Operations and Training for Technical Search and Rescue Incidents.

Operational Guidance

I. Definition of rope rescue

A. Rope rescue is defined as any rescue attempt that requires rope and related equipment to safely gain access to, and remove patients from, any hazardous geographic areas with limited access (such as steep terrain, high-rise buildings, and above or below grade structures), using a rope rescue system.

B. Rope rescues are divided into two general categories; low-angle and high-angle rescue. Inclinations less than 30 degrees are considered low-angle and generally don't require rope rescue systems. Inclinations greater than 30 degrees are considered high-angle and do require a rope rescue system.

II. Scene size-up

A. Upon arrival, the first-arriving company officer will assume command, provide an appropriate size-up, acquire a tactical channel through AFD Dispatch, and initiate specific measures that include the following.

1. Request Heavy Rescue response if one has not already dispatched.

2. The Incident Commander should attempt to secure a company representative or witness to the event to determine what happened.

3. Deploy a Recon team to identify the patient's location, position and condition.

4. Attempt to make patient contact (voice).

5. Select an area from which rescuers will be deployed to effect the rescue.

6. Determine equipment needs.

7. Assess all potential hazards.

8. Determine the number of patients.

9. Determine the patient's down time and their mechanism of injury.

III. Command considerations

1. Determine the mode of operation: rescue or body recovery.

2. Identify manpower considerations.

3. Assess the need for additional rescue technicians.

4. Ensure for personnel accountability (PAR).

5. Assess the need for Rehab and crew rotation.

6. Ensure that all needed equipment is on scene.

7. Designate sectors as needed.

   a. Safety.

   b. Recon.

   c. Rescue (deploy rescuers, rigging, rescue system operation).

   d. Support/Logistics.

   e. Rescue Technician(s) to obtain and deliver equipment to the rescue area from Squad 2.

   f. EMS for treatment and transport.

   g. Rehab.

   h. Welfare (for patient's family).

   i. Liaison.

   j. Public Information.

IV. Hazard identification

A. The Incident Commander should identify as many potential hazards as may be found within the incident purview, and ensure that responders take preventive measures to guard against injury. Common hazards that may be encountered during a rope rescue operation include the following:

1. The damaged structure and its components.

2. Patient's compromised fall protection equipment.

3. Extreme weather.

4. Extreme fall hazards.

5. Moving rope found in rescue systems.

6. Trip hazards.

7. Vertical product lines.

8. Rope abrasion.

V. Personnel

A. Key roles should only be filled by qualified rescue technicians.

B. Only current rescue technicians are permitted to deploy on rope, and supervise the development and operation of rope rescue systems.

VI. Personal protective equipment

A. Helmet, gloves, eye protection and appropriate footwear are required while operating in the rope rescue environment.

B. Fall protection shall be provided for rescuers operating near any unprotected edge.

VII. Rescue operations

A. Make the rescue area safe.

B. Establish hazard control zones.

1. The area below the rescue should be included in the hot zone.

2. Restrict entry to only those who have a need to be in the area.

C. Select a rope rescue system appropriate for the situation.

1. The Incident Commander shall approve of the selected rope rescue system.

2. A safety officer, qualified as a rope rescue technician, may also approve the rope rescue system.

D. Rescue operations should be conducted with from low risk to high risk.

E. The rescue sector officer and qualified safety officer shall ensure the overall safety of the raising/lowering system.

F. Low angle rescue considerations.

1. When a non-ambulatory patient requires a patient packaging device, such as a stokes basket, four litter bearers and a belay system are required.

G. High angle rescue considerations.

1. A 15:1 safety factor shall be maintained utilizing two separate rope systems.

2. One rope is to be used as the main line and a second line is to be used as a safety line.

   a. These lines should be attached to both the patient and rescuer(s).

3. Each line should normally have a “bomb proof” anchor.

   a. A “bomb proof” anchor is defined as structural in nature and has no inherent possibility of failure.

   b. Questionable anchor points should be reinforced using secondary anchors.

H. Prior to deployment, all sectors shall be briefed on the incident action plan, which should include incident-specific information.

1. The current situation.

2. Roles and responsibilities of each responder.

3. The incident action plan (IAP) and back-up plan.

4. Any known hazards.

5. Communication methods.

I. The rescue sector will assign rescue personnel to build the rope rescue system and to effect the rescue.

J. The support Sector supports the rescuers, before, during and after the rescue operation.

K. Upon completion of the rescue, patients will be transferred to paramedics for ALS-level examination and treatment.

VIII. Termination of operations

A. Upon determining the termination of operations, the Incident Commander should perform or consider the following measures:

1. Obtain a personal accountability report from all sectors.

2. Inventory and return all equipment to the appropriate apparatus.

3. Place damaged equipment out of service and notify one of the Heavy Rescue commanders for a repair order/replacement authorization.

4. Consider the need for a Critical Incident Stress Debriefing (CISD).

5. Provide a tailboard critique and consider a formal debriefing at a later date and time.

Wilderness Search and Rescue

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

To establish the Albuquerque Fire Department's operational methods for maximizing search and rescue, and the evacuation of trapped or injured persons from wilderness areas within our jurisdiction or when providing mutual aid, while providing for rescuer safety.

Guideline

This guideline defines size-up, response modes, and command structures that may be appropriate for wilderness search operations. It also describes hazards that may be encountered on such operations, and the protective measures that should be employed to ensure AFD responder safety. It is the responsibility of all command and company officer to be familiar with the employment of this operational guide.

This guideline applies to all emergency incidents where person(s) are in need of rescue and/or evacuation from wilderness areas that are not accessible by emergency response vehicles that are within our jurisdiction. Wilderness areas are designated as follows: the bosque along the Rio Grande; Albuquerque Open Space areas along the foothills of the Sandia Mountains; and unimproved areas of the West Mesa. The basis of this guideline was obtained from NFPA 1670: Standard on Operations and Training for Technical Search and Rescue Incidents.

Operational Guidance

I. Command and control

A. The Albuquerque Fire Department shall retain Command and Control of all rescue incidents that occur within our jurisdiction.

B. Volunteer Search and Rescue Teams shall be utilized as an additional resource and shall be required to report to command and operate within the established Incident Command System and Incident Action Plan (IAP).

1. If utilized, volunteer rescue team members shall report to their Search and Rescue team leader. The team leader shall be provided with a radio and designation/call sign, be informed of their assignment, and to whom they are reporting.

2. At no time will there be two separate incident commanders and/or incident action plans; standard IMS/ICS practices will apply. Search

and Rescue Volunteers shall be held in staging, located at the base camp until deployed by Command.

C. It is an option to utilize a "Unified Command" structure when multiple agencies respond to the same wilderness search and rescue incident.

D. Search and Rescue incidents that occur outside of our jurisdiction are coordinated by the New Mexico Department of Public Safety through a recognized "New Mexico State Police Incident Commander" who is supported by recognized Search and Rescue Teams.

1. Command is required to contact New Mexico State Police when the incident is determined to be outside of our jurisdiction.

2. Standard IMS/ICS practices shall apply when providing mutual aid to outside jurisdictions.

II. Scene size-up

A. Upon arrival, the first-arriving company officer will assume command, provide an appropriate size-up, acquire a tactical channel through AFD Dispatch, and initiate specific measures that include the following.

1. Request a Heavy Rescue response if it has not already been dispatched.

2. The Incident Commander should interview the reporting party to determine what happened and the situation's urgency.

3. Assess all hazards.

4. Determine the number of victims.

5. Determine the condition of the victim(s) and the mechanism of injury.

6. Define the mode of operation:

a. Search.

b. Rescue.

c. Body recovery.

7. Define manpower considerations:

   a. Assess the need for additional rescue technicians.

   b. Ensure personnel accountability.

   c. Assess the need for Rehab and crew rotation.

8. Determine current and forecasted weather conditions:

   a. Temperature.

   b. Precipitation.

   c. Winds.

9. Conduct a risk/benefit analysis.

10. Ensure that all needed equipment is on scene.

11. Designate the following Sectors (as needed):

   a. Safety.

   b. Rescue.

   c. EMS (treatment and transport).

   d. Rehab.

   e. Welfare (for patient's family).

   f. Liaison.

   g. Staging.

   h. Public Information.

12. Determine the need for additional resources.

    a. New Mexico DPS Search and Rescue Coordinator.

    b. Albuquerque Mountain Rescue Counsel (pager 969-0606).

    c. Search dogs.

    d. Trackers.

    e. Aerial support to assist with search operations or patient evacuation.

    f. Mine rescue specialists.

III. Hazard identification

A. The Incident Commander should identify as many potential hazards as may be found within the incident purview, and ensure that responders take preventive measures to guard against injury. Common hazards that may be encountered during a wilderness search operation include the following:

1. Personal hazards:

    a. Blisters.

    b. Soft tissue injuries.

    c. Dehydration.

    d. Sunburn.

2. Dangerous wildlife:

    a. Snakes, biting insects.

    b. Mountain lions, bears.

3. Extreme weather:

a. Temperature extremes.

b. Thunderstorms and lightning.

c. Blizzards.

d. High winds.

4. Fall hazards such as cliffs, steep slopes, and/or abandoned mines.

5. Difficult terrain such as loose ground cover or slippery surfaces.

IV. Personal protective equipment (PPE)

A. Conventional firefighting PPE is inappropriate for use in the wilderness setting.

1. If operating in a rope rescue environment, helmets with lights, gloves and eye protection are required.

2. Clothing worn by deploying personnel shall be appropriate for the anticipated weather conditions.

V. Responding personnel

A. Personnel not fit for wilderness deployment due to physical limitations or inappropriate clothing/footwear shall be limited to support functions at the base camp.

B. Deploying personnel should keep self-sufficiency in mind.

C. Deploying personnel should be familiar with land navigation techniques to include the use of a map and compass, and global positioning units (GPS).

D. Personal support equipment includes energy bars, bottled water, emergency shelter, whistle, a field radio, and environmental protective clothing.

VI. Search operations

A. Confine and sector (or segment) the search area.

B. Identify search strategies and methods.

C. Suspend the search when risk to rescuers is greater than the potential benefit.

VII. Rescue operations

A. Provide a briefing prior to deploying personnel. The briefing should include the following details:

1. Current situation.

2. Roles and responsibilities of the SAR group.

3. The incident action plan and any back-up plan.

4. Any known hazards.

5. Anticipated weather conditions.

6. Primary and back-up communication methods.

B. Utilize appropriate and proper rope rescue techniques.

C. Upon arrival to base camp, transfer the patient to paramedics for an ALS level examination and treatment.

VIII. Termination of operations

A. Upon determining the termination of operations, the Incident Commander should perform or consider the following measures:

1. Obtain a personal accountability report (PAR) from all sectors.

2. Inventory and return all equipment to the appropriate apparatus or storage location.

3. Place damaged equipment out-of-service and notify one of the Heavy Rescue Program Coordinator for a repair order/replacement authorization.

4. Consider the need for a Critical Incident Stress Debriefing (CISD).

5. Provide a tailboard critique and consider a formal debriefing at a later date and time.

Electrical Utility Lockout / Tagout

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

This guideline establishes the Albuquerque Fire Department's operational methods for isolating a machine, device, or process from the release of hazardous energy to prevent unexpected release of stored energy during rescue operations. Adherence to these guidelines will prevent accidents due to unintentional machine or equipment start-ups or the unexpected release of stored energy. Stored energy includes electrical, compressed air, hydraulic, steam, and movable liquids or finely divided solids.

Guideline

This guideline applies to all emergency incidents where as a person(s) is trapped, pinned or caught in a device with moving parts or is within a confined space. Lockout/Tagout devices are required during confined space or machinery rescue operations. It is the responsibility of all personnel to become familiar with the methods described in this guideline. These operational methods are regulated by OSHA 29 CFR 1910.147 "The Control of Hazardous Energy."

Operational Guidance

I. OSHA requirements

A. This guideline will serves as the Albuquerque Fire Department's written program of operations for the control of hazardous energy.

B. OSHA makes specific requirements of emergency responder entities.

1. Steps are identified for shutting down and securing equipment using the proper sequence.

2. Steps are identified for applying lockout/tagout devices.

3. Responder personnel need to understand the significance of a lockout device and/or "Do Not Operate" tag.

a. The presence of a lockout device and/or "Do Not Operate" tag signifies that a piece of machinery, product line or process is out of service.

b. Under normal circumstances; only the person that applied the device can remove that device.

4. Personnel should be trained to shut down and secure the equipment.

a. Since it is impossible for AFD Rescue Technicians to possess the knowledge required to secure every piece of equipment or process found in our jurisdiction, every effort shall be made to have a qualified machine/process technician respond to the scene.

b. The absence of the machine/process technician shall not normally delay the extrication operation.

II. Lockout/Tagout

A. All energy sources shall be brought to a zero mechanical state prior to the initiating rescue operations.

1. Lockout/Tagout options should include a device that prevents activation and the application of “Do Not Operate” tag.

a. Physical devices and lockout tags may include locks, chains, and specially manufactured devices.

b. Activating the “Emergency Mechanical Off” (EMO), opening the electrical circuit by switching the power off, removing power by tripping circuit breakers, or by pulling electrical cords.

c. Blanking and blinding.

d. Double block and bleed.

e. Disconnecting mechanical linkages.

f. Removing drive belts, chains, and drive shafts.

g. Misaligning or removing sections of pipe, line or duct.

h. Removing valve handles.

i. Chaining round-handled valve stems in the closed position and locking the chain with a padlock.

j. Draining any product stored in the storage vessel/tank.

2. If an energy source cannot be properly secured, a firefighter shall be assigned to guard the point of activation to assure that no one inadvertently releases the energy source during the extrication.

Structural Collapse

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

The purpose of this guideline is to establish the Albuquerque Fire Department's operational methods for addressing both minor and major structural collapse incidents, maximizing operational methods, and optimizing patient care, while providing for rescuer safety.

Guideline

This guideline applies to all emergency incidents where a person(s) is trapped or pinned within a building by its structural components or is trapped or pinned by its contents following a structural collapse. While a large structural collapse incident is an uncommon event in most jurisdictions, it does have the potential to occur. Such incidents have proven to be very demanding on local emergency response agencies. Major building collapse incidents require good pre-planning, interaction with other agencies and an organized approach to ensure success. 80% of those who can be saved will be rescued in the first 24 hours of rescue operations.

It is the responsibility of all command and company officers to familiarize themselves with the methods described in this operational guide. The basis of this guideline was obtained from NFPA 1670: Standard on Operations and Training for Technical Search and Rescue Incidents and National Urban Search and Rescue Response System, Field Operation Guide.

Operational Guidance

I. Scene size-up (all structural collapse events)

A. Upon arrival, the first-arriving company officer will assume command, provide an appropriate size-up, acquire a tactical channel through AFD Dispatch, and initiate specific measures that include the following.

1. Request a heavy rescue response, if one has not already been dispatched.

2. Conduct a 360° scene survey.

3. Call for additional resources (as appropriate).

4. Identify all potential hazards.

5. Establish hazard zones and restrict entry to only those who have a need to be within the hot zone.

6. Conduct a risk/benefit analysis.

7. Determine the construction type (according to NFPA 1670).

    a. Light-frame construction.

    b. Heavy wall construction.

    c. Heavy floor construction.

    d. Pre-cast construction.

8. Determine building characteristics and the extent of damage.

    a. Identify the location of stairs, elevators, and basements.

    b. Identify access to stairs, elevators, and basements.

9. Determine the collapse type.

    a. Lean-to.

    b. Cantilever.

    c. Pancake.

    d. V-Type.

    e. A-frame.

10. Determine the occupancy type.

11. Determine the number of known and potential victims and their location(s).

    a. Consider the time-of-day.

b. Determine the need for additional transport ambulances.

c. Initiate the Multiple Casualty Incident (MCI) process, if appropriate.

d. Determine the general condition of patient(s) using AFD triage procedures.

12. Develop and communicate the “Incident Action Plan” (IAP).

13. Establish necessary sectors.

a. Rescue/Extrication.

b. Fire suppression.

c. Safety.

d. Rapid intervention teams (RIT).

e. Medical/EMS for triage, treatment, and transport.

f. HazMat.

g. Staging (Level II).

h. Public Information.

i. Law Enforcement.

B. At major incidents, the following issues may need to be initiated in addition to those detailed above.

1. Activate the EOC for resource support.

2. Determine scope and magnitude of the incident.

3. Determine the number and size of structures affected.

II. Additional resources

A. In certain instances, the collapse event may exceed AFD response capabilities. Additional resources may be notified or requested through the EOC.

1. Consider implementing mutual aid agreements (MOU) with neighboring Fire Departments.

2. Local law enforcement (APD, BernCo S.O.) and the FBI.

3. Volunteer search-and-rescue teams.

4. Medical air evacuation.

5. CABQ Public Works.

6. Public utility companies to control gas, electric, sewage, and water.

7. Structural engineers to determine and advise regarding building integrity.

8. Heavy equipment and operators from the construction and demolition industries.

9. Lumber and construction suppliers.

10. Red Cross for food services.

11. Sanitation services.

12. National Guard and military resources.

13. FEMA USAR - New Mexico Task Force 1.

14. Federal resource system.

III. Hazard identification

A. The Incident Commander should identify as many potential hazards as may be found within the incident purview, and ensure that responders take preventive measures to guard against injury. Common hazards that may

be encountered during a structural collapse operation include the following:

1. Structural instability.
    a. Weakened structural components.
    b. Free standing walls.
    c. Damaged chimneys.
    d. Secondary collapse.
2. Overhead hazards
    a. Suspended loose debris.
    b. Power lines.
3. Surface hazards.
    a. Sharp debris and impalement hazards.
    b. Slippery surfaces.
    c. Downed power lines.
    d. Trip hazards.
4. Below-grade hazards.
    a. Hazardous atmospheres.
    b. Flooding from water mains and/or water pipes.
5. Utility hazards.
    a. Electricity.
    b. Natural gas.

c. Water or sewage.

6. Other potential hazards.

a. Confined spaces.

b. Hazardous materials that are unique to the occupancy type.

c. Fire and/or explosion potential.

d. Vibration from rescue efforts or heavy equipment.

e. Hazardous dust and particulate matter.

f. Lack of scene control that may lead to unsafe or unorganized rescue efforts.

IV. Indicators of secondary collapse potential

A. Leaning walls.

B. Unusual building sounds.

C. Sagging floor or roof assemblies.

D. Missing, damaged or separating connection points of structural components.

E. Excessive loading of structural elements.

F. Sliding plaster and airborne dust.

G. Separating walls.

H. Racked or twisted structures.

I. Building vibration.

V. Personal protective equipment (PPE)

A. Conventional structural firefighting PPE may not be appropriate for search and rescue operations in collapsed structures.

B. The following equipment is required to be worn when engaging in search and rescue operations.

1. Helmet.

2. Steel-toed boots.

3. Fire resistant coveralls or long sleeve shirts.

4. Gloves.

5. Eye protection.

6. Air particulate masks or respirators, as required.

VI. Structural collapse hazard control

A. Secure utilities: gas, electric, and water.

B. Eliminate surface hazards.

C. Use atmospheric monitors or chemical detection devices to identify the presence of hazardous materials.

D. Ventilate void spaces that are to be entered.

E. Stabilize structure with shoring systems for search and rescue operations.

VII. Search and rescue operations

A. Phase 1. Establish command, perform size up, and recon the incident area.

1. Establish equipment and personnel staging areas.

2. Evaluate structural stability.

3. Shut down all utilities.

4. Establish scene control.

5. Establish hazard zones.

6. Control any potential hazards.

7. Implement and communicate the Incident Action Plan (IAP).

8. Identify search priorities to locate victims.

9. Establish and deploy search teams.

   a. Building marking systems should be utilized as indicated below.

   b. Search teams are tasked to identify victim location.

10. Deploy rescue teams to effect patient extrication.

11. At major incidents establish building “triage teams” to establish search and rescue priorities.

B. Phase 2. Remove surface victims as quickly and safely as possible.

1. Most surface victims are recovered by first responders or civilians.

2. Surface victims account for 50% of all victims.

C. Phase 3. Search void spaces and other accessible spaces.

1. If possible, rescue teams should attempt to gain access vertically, rather than horizontally, to reduce the possibility of secondary collapse.

2. Confined space practices should be utilized when entering voids.

3. Utilize search techniques as indicated below.

4. Utilize appropriate shoring systems.

5. 30% of victims will be lightly trapped.

D. Phase 4. Selected debris removal

1. Patient location should be pre-determined by search methods.

2. Remove debris to access patients.

3. Utilize appropriate shoring systems.

4. The situation may require breaching and breaking techniques.

5. Treat patients for “Crush Syndrome” prior to extrication attempts.

6. Void space or non-structural entrapment accounts for 15% of rescued victims.

7. Entombed victims account for 5% of rescued victims.

E. Phase 5. General debris removal

1. All known victims have been removed.

2. This situation requires heavy equipment and equipment operators.

3. This effort mainly involves the uncovering of human remains.

VIII. Search for victims

A. Search efforts must be given proper emphasis at the beginning of an incident to identify the location of live victims. At least two search methods should be used to verify a victim’s location. The types of searches are identified below:

1. Physical search.

a. Visual.

b. Hailing system (voice call-out).

c. Enter accessible interior passages.

d. Enter void spaces.

2. Canine searches using specially-trained disaster dogs for specific search goals.

a. Live victim dogs.

b. Cadaver dogs.

3. Technical search techniques may involve the use of specific equipment.

a. Acoustic listening devices.

b. Fiber optic cameras.

c. Search cameras.

d. Thermal imaging cameras.

IX. Federal Urban Search and Rescue (USAR) building marking system

A. The Albuquerque Fire Department has adopted the Federal USAR building marking system and the “emergency signaling and evacuation procedure” for structural collapse incidents.

B. Structural / hazard evaluation marking

1 Designed to identify specific information pertinent to each affected building, based on structural evaluation.

2. A 2’ x 2’ square box, spray painted orange, adjacent to the most accessible point of entry.

   a. The box may contain diagonal lines indicating structural stability.

   b. An empty box means that the building is safe for search and rescue operations.

   c. A single slash means that some areas are relatively safe, but other areas may require shoring systems.

   d. An X indicates that the structure is not safe for search and rescue operations and will not be entered by rescuers.

   e. Figure 1 illustrates the marking system.

Figure 1

3. The area left of the box has an arrow indicating direction to the safest entry point.

4. The area right of box is text used to indicate specific information.

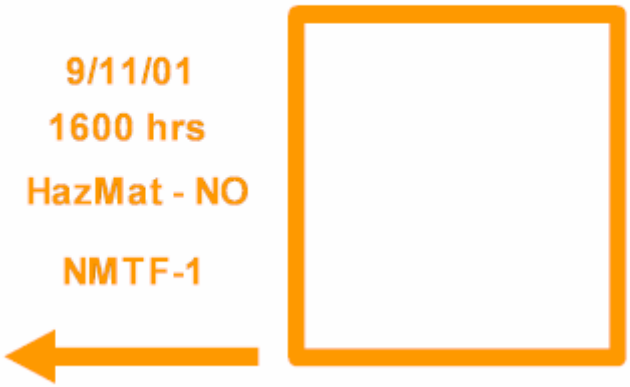
   a. Date and time of search.

   b. Hazards found.

c. Search company or team designation.

d. Figure 2 illustrates additional information that is provided.

Figure 2



X. Search assessment marking

A. A separate and distinct marking system is used to denote information relating to victim location in the areas searched.

B. It is used in conjunction with the structure/hazard evaluation marking system.

C. A 2' x 2' X, spray-painted orange, is formed on the side of the building near each area of entry.

1. The X is constructed in two separate operations.

a. A single slash indicates search operations in progress.

b. Completing the X indicates that the search is complete and that rescuers have exited the building.

D. Areas within the X are marked accordingly.

1. The left quadrant indicates the rescue team identifier.

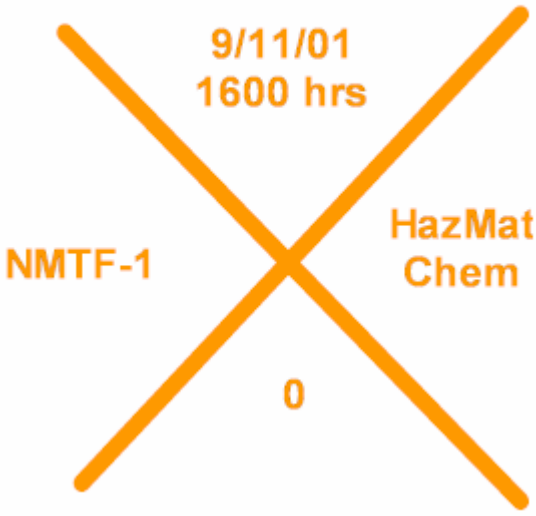
2. The top quadrant indicates the date and time that rescuers departed the structure.

3. The right quadrant indicates personal hazards found.

4. The bottom quadrant indicates the number of live and dead victims still inside the structure. A zero (0) is used to indicate no victims.

5. Figure 3 illustrates the search assessment marking system.

Figure 3



XI. Emergency signaling and evacuation procedures

A. Alerting devices, such as air horns, should be utilized to signal rescuers working in the hazard zone. Specific signals are commonly used to identify required actions.

1. Evacuate the area – 3 short signals (one second each).

2. Cease operations/All quiet – 1 long signal (3 seconds).

3. Resume operations – 1 long and 1 short signal.

XII. Termination of operations

A. Upon determining the termination of operations, the Incident Commander should perform or consider the following measures:

1. Obtain a personal accountability report (PAR) from all sectors.

2. Inventory and return all equipment to the appropriate apparatus.

3. Place damaged equipment out-of-service and notify one of the Heavy Rescue Commanders for a repair order/replacement authorization.

4. Decontaminate personnel and equipment as needed.

5. Coordinate termination activities with other agencies involved.

6. Consider the need for a Critical Incident Stress Debriefing (CISD).

7. Provide a tailboard critique and consider a formal debriefing at a later date and time.

River Rescue

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

The purpose of this guideline is to define the measures that should be considered when responding to river rescue or irrigation ditch rescue incidents, and the Albuquerque Fire Department approach to dealing with those events. They are intended to maximize responder safety, department resources, and victim rescue potential.

Guideline

River Rescue applies to incidents that occur in the Rio Grande River, irrigation ditches, and slower moving water in the North Diversion Channel. A clear distinction must be made between River Rescue and Swift Water Rescue. At AFD, "Swift Water" refers to fast-moving water (with velocities greater than 15 MPH) which is often found in arroyos and flood control channels. This guideline addresses rescue efforts in slower moving water (with velocities less than 15 MPH) which is often found in the Rio Grande River, irrigation ditches, the North Diversion Channel, or in flooded areas. These “in-water” rescue techniques should only be performed in slower moving water, as defined above.

The Heavy Rescue Task Force, consisting of all companies assigned to Fire Station 3 and Battalion 2, provides a River Rescue capability. Only recognized River Rescue Technicians may enter the water (hazard zone) to perform in-water rescue techniques. River Rescue Operations may include shore based, boat-based, and contact swimming rescues.

Operational Guidance

I. River rescue considerations

A. The Rio Grande’s flow is very low in volume and is measured in cubic feet per second.

B. A thunderstorm may easily double or triple the flow within a short period of time.

1. As water speed is doubled, its force is quadrupled.

C. Low and high water levels present their own unique hazards and should be included in the size-up.

D. The United States Geological Survey provides a website at www.USGS.gov that contains real-time flow information for at least three locations along the Rio Grande.

E. The Rio Grande and the irrigation ditches contain what is considered to be "Cold Water".

1. Cold water is defined as being colder than 70 degrees Fahrenheit.

F. An Albuquerque Open Space master key is required to open the gate locks that provide access to the roads adjacent to the Rio Grande and irrigation ditches. The following units have access keys for these locks:

1. All Battalion Commanders.

2. Squad 2.

3. Wildland firefighting companies.

G. Equipment logistics

1. River rescue equipment and an inflatable boat is stored in a Sport Utility Vehicle that is housed at Station 3.

a. The boat should be inflated and secured on top of the SUV vehicle during the City's "monsoon season" and parked inside the fire station.

i. The rainy season typically begins in early July and ends in mid-September.

b. During all other periods, the boat may be deflated and stored inside the SUV vehicle and parked outside in the station parking lot.

II. 911 caller interview

A. AFD Dispatch will follow appropriate Fire Priority Dispatch protocol.

1. Standard questions for River Rescue (72 Echo 3) calls apply.

B. AFD Dispatch will additionally attempt to gain the following information from the caller:

1. Determine what ditch or section of the river the victim is in, and at what cross street and/or bridge the victim was last seen.

2. Determine if the victim(s) are moving in the water or are stationary.

3. Strongly consider dispatching another fire company or APD to interview third party witnesses that cannot be readily interviewed by phone.

III. Deployment considerations

A. For incidents in which the victim(s) are reported to be moving downstream, the Incident Commander does not need to be on-scene, but can assume a geographic command over all rescue sites.

1. Driving code 3 does not facilitate adequate communication, planning, forecasting or incident coordination.

2. At the discretion of the Incident Commander, a second Battalion Commander may be dispatched to the primary rescue site.

3. All dispatched companies will communicate "enroute" and "arrived" transmissions by both radio and MDT.

4. Command will assign sectors according to the cross street or by the geographic area where companies are located.

a. Example: Rio Grande at Alameda Bridge becomes the “Alameda Sector.”

5. All Sector Officers will inform Command when their sector is prepared for rescue operations.

B. For all other incidents, such as river rescue events based in one geographic location or where the victim is stationary, responding companies should respond directly to the incident location, as per dispatch protocols.

IV. APD role and responsibilities at river rescues

A. The role and responsibility of Albuquerque Police Department personnel in River Rescue is limited to specific issues.

1. Spotting the location of the victim(s).

2. Witness interviews.

3. Scene, crowd, or traffic control.

B. AFD-APD communication and coordination.

1. The AFD Incident Commander will contact APD on the “Metro” Talk Group and switch to the appropriate APD Channel.

a. The AFD Incident Commander will inform APD of incident details, as currently known.

b. The AFD Incident Command will request the APD Officer-in-charge to coordinate the spotting locations as determined by AFD Command.

c. It is imperative that APD provide timely information to the AFD Incident Commander.

V. Personal protective equipment (PPE) and HazMat precautions

A. Specific PPE will be worn during all River Rescue operations.

1. Swift water rescue helmet.

2. Knife.

3. Whistle.

4. Personal flotation device (PFD) Type III or V.

5. River rescue boots and fins.

6. Work gloves when handling ropes.

7. Dry suits for in-water rescue operations.

B. Water may contain biological and chemical contaminants.

1. The use of dry suits for in-water operations will reduce exposure potential.

2. River Rescue Technicians should avoid swallowing river water and have clean drinking water available to rinse out their mouths upon exiting the water.

3. Gross decontamination will be provided by an Engine Company, using tank water upon the rescuer exiting the water.

VI. Considerations for rescuer safety

A. "Self-sacrifice in rescue operations is traditional and commendable…. and usually a useless waste" (Rescue 3 International).

B. The desire to save a life that is already lost, especially a child's, can be fatal to a rescuer who ignores safety considerations. Rescuers must not allow compassion for that which is already lost to overrule better judgment or compromise the initial risk assessment.

C. Every rescue operation should establish downstream safety teams.

1. Safety teams should have throw bags.

2. Rescue board swimmers and/or additional personnel should be available to assist with victim removal.

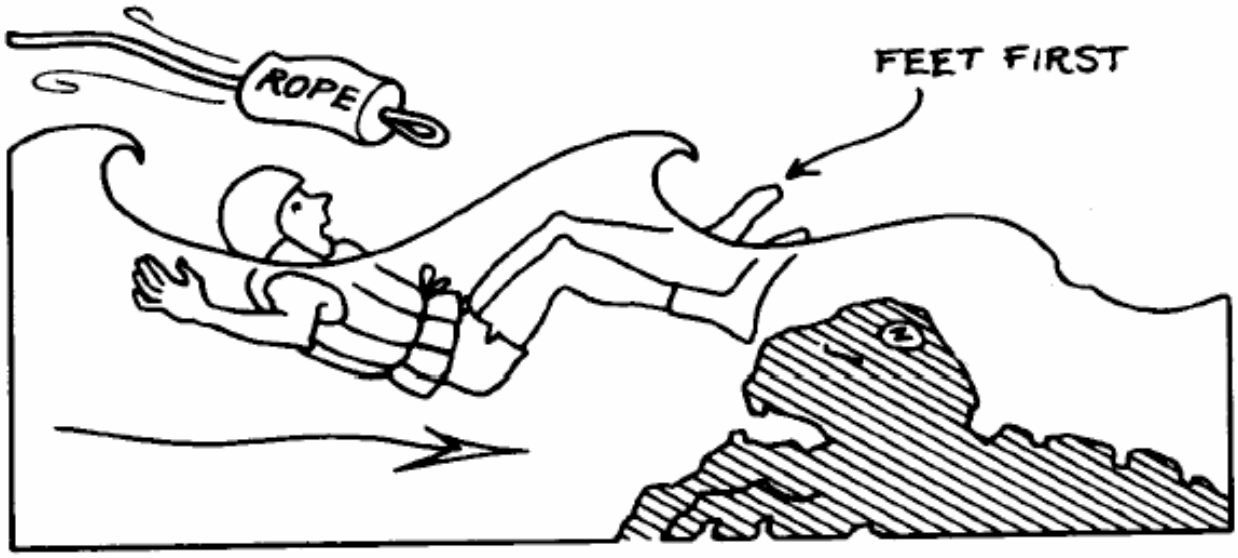
VII. Essential self-rescue skills

A. Any crewmember assigned to shore operations who falls in the water should utilize basic survival techniques.

1. Assume a safe swimming position: facing downstream, on one's back, keeping feet near the surface of the water.

   a. This position minimizes the danger of entrapment [in obstacles or current hazards.

   b. This position allows a downstream view and allows one to avoid/ fend off obstacles with the feet.



2. Avoid foot entrapment, which can lead to drowning as the force of the current is usually strong enough to prevent self-rescue.

   a. A person in the water should not attempt to stand up or stop going downstream by pushing against the river bottom with one's feet as this invites foot entrapment.

   b. Foot entrapment is usually caused when a swimmer attempts to stand up in moving water and gets a foot jammed into a crevice.

3. Get out of the water as soon as possible.

a. Swim aggressively toward eddies (slow moving water).

b. Do not attempt to stand up until completely out of the main current.

4. Be prepared for, and expect, a rescue attempt using throw ropes.

a. Catch the throw rope.

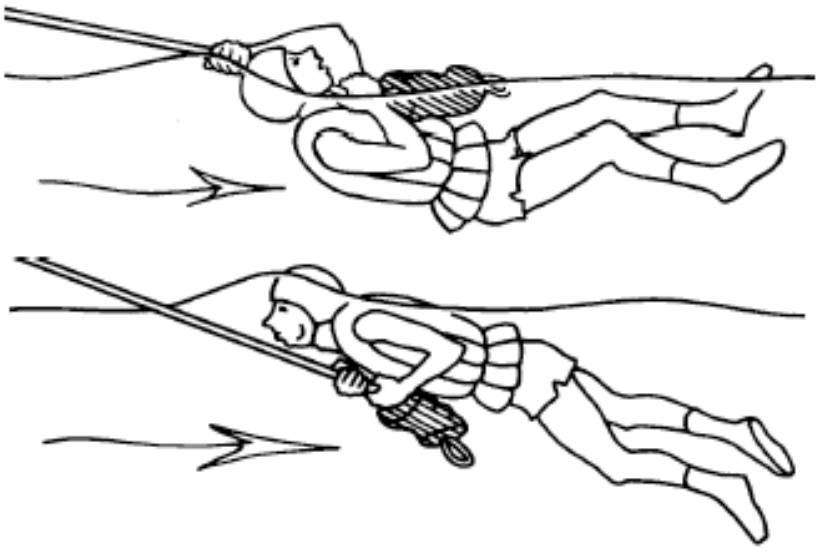
b. Pull the rope to your chest.

c. Roll over on your back, putting the rope over the shoulder furthest from the bank toward which you are headed.

d. Face downstream with the rope over your shoulder, angling your body at a 45º angle to the current.

i. This body position, which is called a ferry angle, will cause the water to push you more quickly toward the side.

e. Do not grab the rope and face upstream, since this action will get you a face full of water and cause you to let go of the rope.



5. Swim aggressively away from strainers.

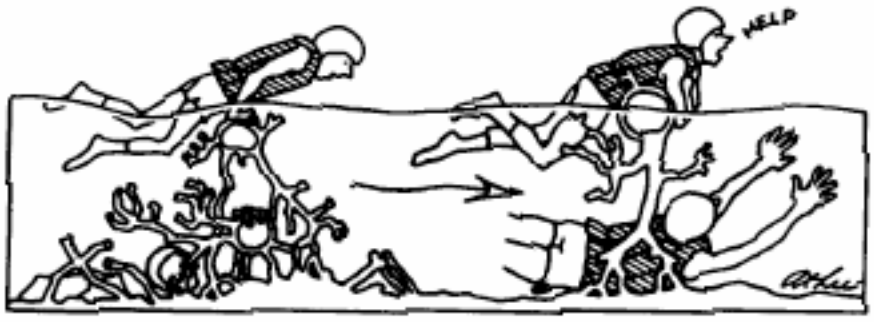
   a. Strainers are obstacles through which the current is flowing, and constitute a drowning hazard for any victim who becomes entangled in the strainer. The best defense against strainers is to avoid them.

   a. If you see a strainer, swim aggressively away from it at a right angle to the current.

      b. If you cannot avoid it, quickly change swimming position: Roll over and swim as fast as possible toward the strainer.

         ii. Try to hit the strainer with some momentum and pull yourself up onto the strainer.

         iii. The goal is to, first, avoid being swept under the strainer, and second, to get your body out of the water and away from the force of the current.



6. React to stationary underwater debris as you would a strainer.

   a. Stationary underwater debris may leave very little “signature” on the water’s surface.

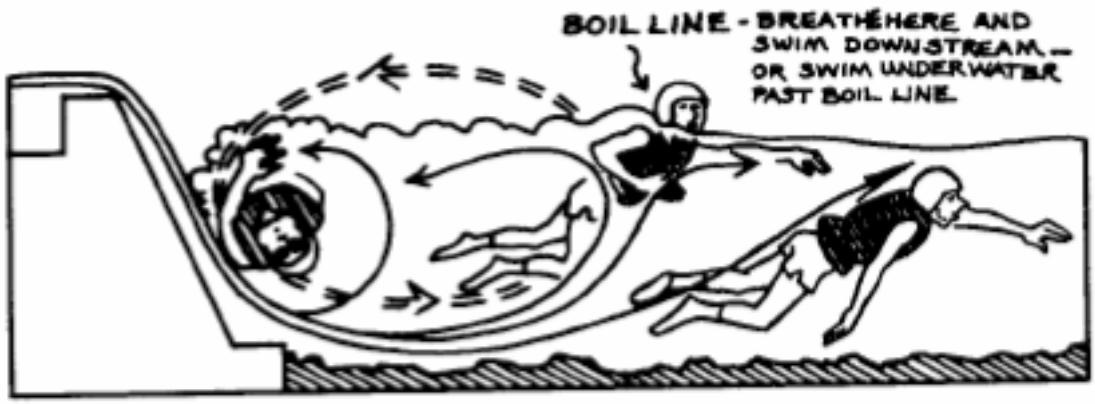
   b. Stationary underwater debris may act as a strainer or may snag clothing.

7. If the current is taking you over a vertical drop, pull your knees up against your chest and "ball up" to avoid foot entrapments and extremity injury,

8. If the current is taking you over a low-head dam (also called a "hydraulic"), which is a backwash that traps and recirculates anything that floats, your primary concern is to avoid getting caught underwater in the re-circulating current.

   a. Escape can be very difficult and can best be accomplished by swimming downstream, after surfacing.

   b. An alternate escape method is to catch the downstream current while underneath the water's surface.



9. Avoid bridge abutments by swimming aggressively away from them at a right angle to the current.

   a. Bridge abutments usually have little in the way of a hydraulic cushion and often collect debris piles which become dangerous strainers.

VIII. Rescue techniques

A. "Reach" operations

1. Reaching is the safest and most preferable method of water rescue and should be the rescuer's first choice option. Objects which can be utilized include:

    a. Pike pole.

    b. Stick.

    c. Piece of hose.

    d. Backboard.

    e. Water rescue flotation buoys (Jim Buoys).

2. A rescuer who remains on shore and reaches an object to a person in the water can quickly assist the victim while maintaining a high degree of safety.

B. Throw bag operations

1. More people are rescued in moving water with throw bags than with any other method.

2. Rescuers assigned to perform throw bag operations should take at least two throw bags and deploy in an area where the victim can be safely brought to shore.

3. Throw Bag protocols are more thoroughly explained in the Swift Water Rescue Systems Guideline.

C. Boat operations

1. Inflatable boats provide a safe, stable rescue platform for in-water rescue operations and should be considered when shore-based techniques would be ineffective.

    a. Boat operations require access to an upstream boat launch and a downstream takeout site.

b. The boat can be operated as a free-floating rescue platform or can be tethered on a rope rescue system.

2. Flat water (very slow moving water) is ideal for using paddles to maneuver the rescue boat into position.

3. Boat-tethered rope systems include the following:

a. Two-line tether.

b. Four-line tether.

c. High line with shore-controlled descent.

d. High line with boat-controlled descent.

4. The system used should be based upon the following considerations:

a. Water flow.

b. Number of victims.

c. Set-up time.

d. Weather.

e. Stability of the situation.

f. Rescuer and victim safety.

g. Available equipment.

h. Number and availability of trained personnel.

D. Rescue swimming operations

1. At times, the most effective rescue method is to deploy rescue swimmers into the water to affect the rescue by direct contact with the victim.

2. Rescue swimmers must be recognized River Rescue Technicians and be properly equipped and supported to perform in-water rescues.

3. Direct victim contact is the most dangerous type of water rescue technique and at no point should the rescue swimmer feel they must sacrifice themselves in order to provide for the rescue of a panicked victim.

   a. Panicked swimmers are not rational and will grab on to anything, including the rescuer, in order to stay afloat.

   b. Rescuers should avoid direct contact with panicked victims by employing evasive swimming maneuvers.

   c. Panicked victims should be rescued by providing a floatation device (such as a rescue board) to the victim, who should then be towed to safety by the rescue swimmer.

   d. Direct contact rescue techniques may be used on cooperative victims.

E. Boat-based rescue is usually the safest rescue technique when a vehicle is in the water with trapped victims inside.

1. Rescue operations should focus on removing the victims in the safest manner possible with the least amount of risk to the rescuers.

2. If the vehicle is unstable, stabilize the vehicle by attaching a winch cable or hoisting rope (a cable is preferable) to one of the vehicle posts to keep the vehicle from rolling or moving. Consider requesting a tow truck or wrecker.

3. Prior to any rescue attempt, provide personal flotation devices (PFD) and helmets to all victims.

4. Access the vehicle utilizing the inflatable boat or other reaching options, such as ground ladders**.**

a. Consider approaching the car from the eddy created downstream of the vehicle itself.

b. Be prepared to break windows.

c. Be aware that there may be sharp metal edges or other hazards located below the water line.

8. Rescuers should not be put at risk to salvage a vehicle.

a. River Rescue Technicians shall not go below the surface of the water to connect tow chains or straps.

b. The AFD/APD Metro Dive Team should be activated and deployed for any sub-surface salvage operations.

IX. Victim search considerations

A. The Heavy Rescue Task Force may be deployed to perform a search for submerged victims.

B. Additional resources may be needed to search the banks of waterways.

C. Witnesses must be interviewed to help determine a “last seen point.”

D. Every effort should be made to perform a rapid and complete search of a reasonable area to ensure victim accountability.

E. The Metro Dive Team may also be activated and deployed for sub-surface victim search.

X. Patient care considerations

A. All victims should be assessed for

1. Near–drowning.

2. Hypothermia.

3. Traumatic injuries.

B. Consider using low angle rope rescue techniques to evacuate litters up slippery slopes.

C. Handle patients gently even if they are conscious due to possible hypothermia.

D. Aggressive airway management should be considered for any unconscious near drowning victim per medical protocols.

E. All near-drowning patients should be transported to the hospital for further evaluation.

XI. Post deployment

A. Following any water deployment, the ranking officer shall ensure that all equipment is inspected, dried and returned to the appropriate response vehicle.

B. PPE will be inspected and returned to serviceable condition.

C. Dry suits will be rinsed in clean water and hung to dry by the feet.

1. After the dry suits are dried, zippers will be lubricated and worked with plain paraffin wax on both sides of the zipper teeth.

2. Wrist and neck seals will be treated with unscented talc and returned to their storage bags with the bag zipper ¾ open.

D. Ropes will be appropriately maintained.

1. Clean and dry ropes.

2. Rescue rope use will be documented in the rope log.

3. Rescue rope designated for water/river rescue will be kept separate from other rescue rope and will not be used for high angle rescue operations.

Air Bags

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

An Air Bag System is assigned to each Rescue Company within the Albuquerque Fire Department. This guideline addresses the use of air bag systems. Although only Rescue Companies carry this equipment, any responding company may be required to operate this equipment. Familiarity with this guideline will maximize the effectiveness of air bag use during an emergency response.

The system includes rescue bags that are inflated with air from a compressed air tank, and used as lifting devices. The system is made up of the SCBA bottle, cables, and lifting bags.

Guideline

The selection and use of high pressure air bags must be determined based on factors such as the lifting requirements, weights, size, and/or shape of the object(s) to be lifted. The lifting capacities and lifting heights of the air bags themselves should also be considered before they are used.

Operational Guidance

I. Calculating lifting capability

A. The lifting capacity of an air bag is dependent upon a number of varied factors, including the following:

1. The amount of air pressure in the bags.

2. The surface contact area between the air bag and the load being lifted.

   a. The more surface area contact between the air bag and the load, the greater the lifting capacity.

   b. As the air bag inflates, it takes on a double-dome shape, decreasing the surface area contact between the load and the air bag thus decreasing the lifting capacity.

   c. The rated lifting capability is possible for the first inch of lift, and decreases thereafter.

d. The lifting capacity of two or more air bags placed side by side and inflated together is the combined capacity of both air bags.

e. The lifting capacity of two air bags -- stacked and inflated -- is the maximum capacity of the smallest air bag.

II. Operating instructions

A. Develop a lifting strategy by considering the following:

1. The maximum lifting capacity for each air bag.

2. The maximum inflation height of each air bag.

3. The maximum load that can be lifted at full inflation height for each air bag.

B. Setting up the system

1. Make necessary connections according to the manufacturer's instructions.

2. Ensure that all connections and/or couplings are locked and are secure.

3. Ensure that all valves are in the closed position.

4. Open the SCBA bottle.

a. Set and verify the working pressure, if needed, at the regulator:

i. 118 psi for Hurst air bag systems,

ii. 116 psi for Holmatro air bag systems.

C. Placement considerations

1. Always estimate the center of gravity to determine the best placement of the bags.

2. If a one point-of-lift is used to make a one-sided or rolling lift, position the air bag in-line with the estimated center of gravity.

3. If two points-of-lift are desired, place one air bag on either side of the estimated center of gravity.

D. Lifting beams

1. An air bag's maximum lifting capability cannot be obtained when the air bag takes on the shape of a saddle during inflation; additionally, lifting beams may damage the air bag.

2. Position a plywood panel between the air bag and the load being lifted to distribute the load and to protect the air bag

E. Lifting a cylindrical object

1. Avoid lifting a large diameter cylindrical object with a single air bag due to instability.

2. Use two air bags, one under each side of the cylindrical object, and inflate the air bags simultaneously.

F. Pushing with air bags

1. Position the air bag between the object to be moved and another stable object. The object that is less secure, or has less mass, will move first.

G. Cribbing

1. There are two types of cribbing used with air bags.

a. Box cribbing is used to support a load that has been lifted.

i. Always build a box crib to support the load once the object is lifted.

ii. Rescuers should never solely rely on the air bag to support the load.

iii. Rescuers should never place any body part under the load unless the load is supported by a box crib.

iv. Assess the need for additional cribbing needs and call for additional resources if needed.

b. Support cribbing is used to support the air bag while lifting.

i. Support cribbing maximizes lifting capacity and the lifting height of the air bag.

ii. The bottom of the air bag should rest on a solid layer of cribbing base and the top of the support crib must be equal to, or greater than, the surface area of the air bag.

iii. It is important to protect the lifting surface of the air bag by using a plywood panel.

D. Stacking air bags.

1. Position air bags with the nipples pointing away from the load and opposite each other.

2. Use the following guidelines when stacking air bags of different sizes,

a. Always place the larger air bag on the bottom.

b. The smaller air bag must be centered on top.

c. Use different colored hoses to distinguish between air bags.

d. Never stack more than two air bags.

3. The result of stacked air bags include:

a. Less surface contact area.

b. A decreased lifting capacity.

c. Instability between the two air bags.

i. To prevent the two air bags from slipping, maintain a lower pressure in the bottom air bag than in the smaller air bag, so that the smaller air bag is cradled by the larger one.

III. Air bag inflation

A. Don PPE.

1. Helmet, eye protection, and gloves.

B. Establish a hot zone of at least 50 feet around the lifting operation.

C. Establish verbal commands and hand signals between the officer in charge, the air control valve operator, and the rescuer placing the bag.

1. Only one person is to issue commands as indicated in Table 1 below:

Table 1

Voice and Hand Signals

Command	Voice signal	Hand signal
Inflate	“up on (hose color)”	Thumb up
Stop inflation	“stop on (hose color)”	Clenched fist
Deflate	“down on (hose color)”	Thumb down

2. Anyone can stop the lifting operation for safety reasons by calling “STOP.”

D. Pressurize the air bag system slowly.

E. If stacking air bags, follow routine inflation guidelines, in addition to the following criteria:

1. Inflate the bottom air bag until the top air bag firmly contacts the underside of the load, then inflate the top air bag.

2. Anticipate and prepare for shifting loads.

    a. Place wheel chocks.

    b. Use cribbing.

    c. Establish safety zones.

3. Continue inflation until the air bag reaches the desired height or until the bag reaches the maximum working pressure.

4. Always build a box crib to support the load once the object is lifted.

5. Never work under a load without cribbing.

6. Air bags should be filled using 1-hour SCBA bottles.

IV. Air bag deflation

A. Deflate the air bag slowly.

B. If stacking air bags, deflate the top air bag first followed by bottom air bag.

C. Deflate the air bag(s) and allow the load to settle on the box cribbing if more working space is needed.

V. Inspection, storage and maintenance

A. Inspection

1. Inspect all air bag components for damage after each use, or at least once a cycle.

    a. Check air bags and hoses for cuts, cracks, or nicks.

    b. Check nipples and couplings for damage.

c. Check all other hardware for damage.

2. At least once per calendar quarter, assemble the air bag system and inspect the system while it is inflated to the maximum operating pressure.

a. Check for bulges.

b. Check for leaks by applying soapy water.

B. Storage

1. Vertical storage.

a. Store air bags with nipples pointing upward and outward with protective caps in-place.

2. Horizontal storage.

a. Store air bags with nipples facing outward with protective caps in-place.

b. Store hose in a coiled position, with sections connected together, to protect nipples.

c. Store the air valve controller with relief valves open.

d. Store the regulator and air valve controller in protective cases.

C. Maintenance and cleaning

1. Clean air bags with a stiff brush, using mild soap and water.

2. Wipe all other components with a clean rag.

3. No other user maintenance is required. If other problems exist, report the equipment to AFD Logistics for replacement or repair.

VI. Safety considerations

A. The use of air bags should be considered an inherently dangerous operation. It is important to maintain the following safety considerations when performing such operations.

1. Always wear helmet, eye protection, and gloves during lifting operations.

2. Never work under a load without cribbing.

3. Never exceed the manufacturer's recommended working pressure.

4. Never stack more than two air bags on top of each other.

ALBUQUERQUE FIRE DEPARTMENT
STANDARD OPERATING GUIDELINES

Reciprocating Saws

SOG Committee Action	Implemented 07/01/08	Revision	Implemented 07/01/08

Purpose

This document establishes safe operating guidelines for Albuquerque Fire Department standard issue reciprocating saws.

Guideline

A DeWalt Cordless Reciprocating Saw is standard issue on each AFD Rescue Company. The saw is powered by a nickel-cadmium battery pack and supplied with a 1 hour charger, spare battery and various blades. These saws are intended to be used for a variety of rescue applications, including vehicle and machinery extrication.

Operational Guidance

I. General safety

A. Do not operate tools in explosive atmospheres, such as in the presence of flammable liquids.

B. Always wear eye protection.

C. Disconnect the battery pack from the tool or lock the trigger switch before making any adjustments, changing blades, or storing the tool.

D. Keep hands away from cutting area.

E. Do not use dull blades, as dull blades may cause the saw to swerve.

F. Remove any cracked or damaged battery packs from service. Turn damaged battery packs into AFD Logistics for replacement.

G. Do not store or use the tool and battery pack in locations where the temperature exceeds 105º F.

II. Charging

A. According to the manufacturer, the nickel-cadmium battery packs will not develop a memory.

B. Place a fresh battery in the saw on the first morning of every cycle (first day shift), during vehicle checks.

C. Batteries will charge in about one hour.

D. During charging, a red light on the charger will blink continuously.

1. When the charge is complete, the red light will remain on.

2. The battery will maintain its charge if the battery pack is left in the charger.

3. Battery packs will slowly lose their charge when not left in the charger.

III. Operation

A. Always use two hands when operating the saw.

B. Place the saw shoe firmly against the material that is being cut.

C. If the saw fails to produce significant power, discontinue use and cut the material with a hack saw.

1. Continued use of the saw may damage the battery if it is completely drained of power.

2. Replace the battery as needed before it is drained of power.

D. Do not force the blade. Let the saw do the work.

E. Always use heavy-duty blades that are rated for “demolition and/or extrication.”