

SUBJECT: FIRE GROUND SAFETY**SECTION:** 306.03**REVISED:** DECEMBER 18, 2003**PAGE(S):** 8

OPERATIONS IN HAZARDOUS ENVIRONMENTS

Personnel operating in hazardous environments at emergency incidents shall operate in teams of two or more.

Team members operating in hazardous environments shall be in communication with each other through visual, audible, or physical means, in order to coordinate their activities. Team members shall be in close proximity to each other to provide assistance in case of an emergency.

At working structural fires a minimum of four personnel should be required, consisting of two personnel working as a team in the hazardous atmosphere, who should remain in voice or visual contact with each other; and two personnel who are located outside the hazardous atmosphere, who should be responsible for maintaining a constant awareness of the number and identity of those operating in the hazardous atmosphere and be prepared to perform rescue of those members if required.

Initial attack operations shall be organized to ensure that, if upon arrival at the emergency scene, the initial attack personnel find an imminent life-threatening situation where immediate action could prevent the loss of life or serious injury, such action shall be permitted with less than 4 personnel. No exception shall be permitted when there is no possibility to save lives. Any such actions taken shall be thoroughly investigated by the Fire Chief.

TACTICAL POSITIONING

Positioning of operating companies can severely affect the safety/survival of such companies. Personnel must use caution when placed in the following positions:

- Above the fire (floors/roof).
- Where fire can move in behind them.
- When involved with opposing fire streams.
- Combining interior and exterior attack.
- Where sector cannot control position/retreat.
- With limited access - one way in/out.
- Operating under involved roof structures.
- In areas containing hazardous materials.
- Below ground fires (basements, etc.)
- In areas where a backdraft potential exists.

The safety of firefighting personnel represents the major reason for an effective and well-timed offensive/defensive decision and the associate write-off by Command. THE TWO STRATEGIES ARE BASED ON A STANDARD RISK MANAGEMENT PLAN THAT IS TO BE EMPLOYED AT ALL STRUCTURE FIRES.

WITHIN A STRUCTURED RISK MANAGEMENT PLAN

- WE MAY RISK OUR LIVES TO SAVE A LIFE.
- WE MAY PUT OURSELVES AT MODERATE RISK TO SAVE PROPERTY.
- WE WILL RISK NOTHING TO SAVE LIFE OR PROPERTY THAT IS ALREADY LOST OR DESTROYED.

When operating in a defensive strategy, operating positions should be as far from the involved area as possible while still remaining effective. Position and operate from behind barriers if available (fences, walls, etc.).

The intent is for personnel to utilize safe positioning where possible/available, in an effort to safeguard against sudden hazardous developments such as backdraft explosion, structural collapse, etc.

When operating in an offensive strategy, be aggressively offensive. An effective, coordinated interior attack operation directed toward knocking down the fire eliminates most eventual safety problems.

Due to the inherent hazards of the fire or incident scene, efforts must be made by Command to limit the number of personnel on the fireground to those assigned to a necessary function. All personnel shall be:

- Positioned in Staging.
- Assigned to a task or operating within a sector.
- Having completed an assignment and no other assignment is available within that sector; crews should be assigned to Staging or the Rehabilitation Sector until such time as they can be reassigned to an operating sector or released to in-service status.

The intent of this procedure is to minimize fireground confusion/congestion and to limit the number of personnel exposed to fireground hazards to only those necessary to successfully control the operation. Individuals or crews shall be restricted from wandering about the fireground or congregating in non-functional groups. If personnel have not been assigned to a sector or do not have a necessary staff function to perform, they shall remain outside the fireground perimeter.

When it is necessary to engage personnel in exceptionally hazardous circumstances (i.e., to perform a rescue), Command will limit the number of personnel exposed to an absolute minimum and assure that all feasible safety measures are taken.

In extremely hazardous situations (flammable liquids, LP gas, special operations, etc.), Command will engage only an absolute minimum number of personnel within the hazard zone. Unmanned master streams will be utilized wherever possible.

In situations where crews must operate from opposing or conflicting positions, such as front vs. rear attack streams, roof crews vs. interior crews, etc., utilize radio or face-to-face communications to coordinate your actions with those of the opposing crew in an effort to prevent needless injuries. Command should notify Sector Officers or Company Officers of opposing or conflicting operations.

Ground crews must be notified and evacuated from interior positions before ladder pipes go into operation.

Do not operate exterior streams, whether hand lines, master streams, ladder pipes, etc., into an area where interior crews are operating. This procedure is intended to prevent injuries to personnel due to stream blast and the driving of fire and/or heavy heat and smoke onto interior crews.

When laddering a roof, the ladder selected should be one which will extend 2' - 3' above the roof line. This should be done in an effort to provide personnel operating on the roof with a visible means of egress.

If possible, when laddering buildings under fire conditions, place ladders near building corners or fire walls as these areas are generally more stable in the event of structural failure.

When operating either above or below ground level, establish at least two (2) separate escape routes/means where possible, (such as stairways, ladders, exits, etc.), preferably at opposite ends or diagonal corners of the building or separated by considerable distance.

Hazard Area The Hazard Area will be defined as any area that requires an SCBA, charged hoseline, special protective clothing, or in which firefighting personnel are at risk of becoming lost, trapped, or injured by the environment or structure. The following situations would be included inside the Hazard Area:

- Entering a structure reported to be on fire
- Operating in close proximity to the structure during exterior operations
- Confined Space
- Trench Rescues
- Operating close to crane operations or close to swift water operations
- Building collapse
- Operating close to helicopter operations
- Extrication

ALL FIREFIGHTERS WORKING IN THE HAZARD AREA ZONE SHALL BE IN CREWS OF A MINIMUM OF TWO PERSONNEL WITH A PORTABLE RADIO. THE ACCOUNTABILITY SYSTEM WILL BE IN PLACE.

Warm Zone The Warm Zone will be defined as just outside of the Hazard Area where the firefighters start their operations on the fireground. This zone is where the firefighter is not at risk of becoming lost, trapped, or injured by the environment or structure. The following functions could be done in this zone:

- Forward fire apparatus working the incident (i.e.; engines, ladders)
- Laying lines
- HMRT and TRT developing strategies and tactics
- Utility trucks
- Special equipment needs
- Accountability Officer
- FIRE Investigations

If at any time firefighters in the Warm Zone become threatened, this area would become a Hazard Area.

Cold Zone The Cold Zone will be defined as outside of the Warm Zone where no one is at risk because of the incident. The following functions could be done in this area:

- Command
- Level I & Level II staging
- Support and Staff personnel
- Canteen
- Rehab
- Media
- P.D. Liaison
- Interviewing the responsible party

ALL PERSONNEL ENTERING THE HAZARD AREA SHALL:

- **WEAR FULL TURNOUTS/ SCBA AS REQUIRED**
- **HAVE CREW INTACT (with a portable radio)**
- **BE ASSIGNED TO A SECTOR**
- **ACCOUNTABILITY PASSPORT PLACED ON STATUS BOARD**

ALL OTHERS STAY OUTSIDE.

SECTORS

The safety of firefighting personnel represents a major reason for fireground sectorization. Sector commanders must maintain the capability to communicate with

forces under their command so that they can control both the *position* and *function* of their companies.

Sector officers and company officers shall be able to account for the whereabouts and welfare of all crews/crew members under their assignment. (See Personnel ACCOUNTABILITY System).

Company officers shall insure that all crew members are operating within their assigned sector only. Crews will not leave their respective sectors unless authorized by the sector officer.

When crews are operating within a sector, company officers should keep the sector officer informed of changing conditions within the sector area, and particularly those changing conditions which may affect the safety of personnel.

Hazards that will affect only a specific sector area should be dealt with within that sector and need not necessarily affect the entire operation.

REHABILITATION

It is the intent of this Sector to reduce the fatigue and trauma experienced during difficult operations to a reasonable (and recoverable) level and is in no way intended to lessen the individual and collective efforts expected of all members during field operations.

In an effort to regulate the amount of fatigue suffered by fireground personnel during sustained field operations, sector officers should frequently assess the physical condition of their assigned companies. When crew members exhibit signs of serious physical or mental fatigue, the entire crew should be reassigned to a Rehabilitation Sector if possible. Company officers should request reassignment to Rehabilitation Sector from their sector officer. The company officer's request should indicate the crew's position/condition, etc., and should advise as to the need for a replacement crew. Individual crews should not report to the Rehabilitation Sector unless assigned by the Fireground Commander. Crew members should report to and remain intact while assigned to Rehab.

It is the on-going responsibility of Command to summon adequate resource to tactical situations to effectively stabilize that situation, and to maintain adequate resource during extended operations to complete all operational phases.

The rotation of companies will be utilized by Command during extended operations to provide an effective on-going level of personnel and their performance. The Dispatch Center will assist in coordinating the rotation of companies during such campaign operations.

SAFETY SECTOR

The recognition of situations which present inordinate hazards to fireground personnel and the proper response to safeguard personnel from those hazards is of critical importance to all fire department operations.

Command has the responsibility to recognize situations involving a high risk to personnel and to initiate appropriate safety measures.

Command should establish a Safety Sector at incidents involving an inordinate danger to personnel. Command should consider establishing a Safety Sector on any situation where it may be advantageous to the overall safety of operations. This should be a high priority assignment.

The establishment of a Safety Sector or the presence of a Safety Officer in no way diminishes the responsibility of all officers for the safety of their assigned personnel. Each and every member shall utilize common (safety) sense and work within the intent of established safety procedures at all times.

STRUCTURAL COLLAPSE

Structural collapse has been a major cause of serious injury and death to fire fighters. The possibility of structural collapse should be a major consideration in the development of any tactical plan.

Structural collapse is always a possibility when a building is subject to intense fire. In fact, if fire is allowed to affect a structure long enough, structural failure is inevitable.

Regardless of the age and exterior appearance of the building, the possibility exists that a principal structural supporting member is being seriously affected by heat and may collapse, inflicting serious injury to firefighters.

Example: A 100' length of unprotected steel will expand 9" when heated to 1100° F.

In the typical fire involved building, the roof is the most likely candidate for failure; however failure of the roof may very likely trigger a collapse of one or more wall sections. This is especially true if the roof is a peak or dome type which may exert outward pressure against both the bearing and non-bearing walls upon collapse. In multi-story buildings or buildings with basements, the floor section above the fire may collapse if supporting members are directly exposed to heat and flames.

A knowledge of various types of building construction can be invaluable to the Fire Officer from a safety standpoint as certain types of construction can be expected to fail sooner than others. For example: light weight truss and bar joist roof construction can be expected to fail after minimal fire exposure.

Structures have been known to collapse without warning but usually there are indications which may tip off an alert fire officer. Action should be taken to avert any imminent hazard.

Signs of building collapse may include:

- Cracks in exterior walls.
- Bulges in exterior walls.
- Sounds of structural movement--creaking, groaning, snapping, etc.
- Smoke or water leaking through walls.
- Flexible movement of any floor or roof where firefighters walk.
- Interior or exterior bearing walls or columns--leaning, twisting or flexing.
- Sagging or otherwise distorted rooflines.
- Time of fire involvement.

The following construction features or conditions have been known to fail prematurely or to contribute to early structural failure when affected by fire.

Contributing Factors:

- Parapet walls.
- Large open (unsupported) areas--supermarkets, warehouses, etc.
- Large signs or marquees--which may pull away from weakened walls.
- Cantilevered canopies--which usually depend on the roof for support and may collapse as the roof fails.
- Ornamental or secondary front or sidewalls--which may pull away and collapse.
- Buildings with light weight truss, bar joist, or bow string truss, roofs.
- Buildings supported by unprotected metal--beams, columns, etc.

Buildings containing one or more of the above features must be constantly evaluated for collapse potential. These evaluations should be a major consideration in determining the strategy, i.e. offensive/defensive.

It is a principal Command responsibility to continually evaluate and determine if the fire building is tenable for interior operations. This on-going evaluation of structural/fire conditions requires the input of company officers advising their sectors and of sectors advising Command of the conditions in their area of operation.

Most structures are not designed to withstand the effects of fire, and can be expected to fail if exposed to heavy fire involvement. If after 10-15 minutes of interior operations heavy fire conditions still exist, Command should initiate a careful evaluation of structural conditions, and should be fully prepared to withdraw interior crews and change to a defensive strategy.

If structural failure of a building or section of a building appears likely, a perimeter must be established a safe distance from the area which may collapse. All personnel must remain outside this perimeter.

SEARCH AND RESCUE

Search and rescue should be performed according to an efficient, well planned procedure which includes the safety of search crew personnel.

The object of the search effort is to locate possible victims, not create additional ones by neglecting the safety of the search crew.

Prior to entering the search area, all search team members should be familiar with a specific search plan including the overall objective, a designation of the search area, individual assignments, etc. This may require a brief conference among crew members before entering the search area to develop and communicate the plan.

Individual search activities should be conducted by two or more members when possible, equipped with a portable radio.

Company officers must maintain an awareness of the location and function of all members within their crew during search operations.

A brief look around the floor below the fire may provide good reference for the search team, as floors in multi-story occupancies usually have a similar layout.

Whenever a search is conducted that exposes search crews to fire conditions (particularly above the fire floor) the search team should be protected with a charged hoseline, in order to insure a safe escape route.

If search personnel are operating without a hose line, life lines should be used when encountering conditions of severely limited visibility.