

*Fire and Rescue Departments of Northern Virginia*

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# Fires in Single Family Dwellings

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between the Fire and Rescue Departments of  
Arlington County  
City of Alexandria  
City of Fairfax  
Fairfax County  
Fort Belvoir  
Metropolitan Washington Airports Authority

Committee members who developed this book  
Chair

Deputy Chief Jeffrey B. Coffman, Fairfax County  
Battalion Chief John J. Caussin, Fairfax County  
Battalion Chief John M. Gleske, Fairfax County  
Captain David G. Lange, Fairfax County  
Captain Jeffery M. Liebold, Arlington County  
Captain Mark W. Dalton, City of Alexandria  
Captain Joel A. Hendelman, City of Fairfax  
Captain Thomas J. Wealand, Fairfax County  
Battalion Chief Chris Larson, MWAA  
Captain Michael A. Deli, Fairfax County  
Captain Floyd L. Ellmore, Fairfax County  
Captain Larry E. Jenkins, Fairfax County  
Scott W. Boatright

Photographer

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# EMERGENCY OPERATIONS MANUAL

## VOLUME II - STRUCTURAL FIREFIGHTING

### Single-Family Dwellings

- 1 INTRODUCTION
- 1.1 BACKGROUND
  - 1.1.1 Statistically, the fatalities in single-family dwellings in Northern Virginia seem to mirror the national average. Most fires and fire fatalities occur in residential occupancies.
- 1.2 PURPOSE
  - 1.2.1 To describe single-family dwellings, which comprise a large portion of the structures throughout Northern Virginia.
  - 1.2.2 To point out the construction features of such buildings with regard to protecting life and extinguishing fires.
  - 1.2.3 To describe the hazards associated with these types of structures and recommend precautions that should be taken.
  - 1.2.4 To establish standard tactics for fires that occur in such structures.
  - 1.2.5 To establish tactics for operations for engine, truck and rescue companies for fires that occur in such structures.
  - 1.2.6 To reduce the loss of life and property by establishing a standard method of operation for companies combating fires in single-family dwellings.

## 2 DESCRIPTION

### 2.1 DEFINITION

2.1.1 The phrase “single-family dwelling” is widely recognized throughout the fire service. In Northern Virginia, a single-family dwelling simply means, “a detached structure constructed to house one family as a place of residence”.

### 2.2 CHARACTERISTICS

2.2.1 The structure may be found in several different settings, most commonly as part of a housing development surrounded by similar type dwellings. The structure may also be found situated somewhat alone on a property in a rural setting. Access may be simple or complex.

2.2.2 The interior area of the structure may also vary. The construction cost and value dictate the square footage. Expect many extremes throughout a typical first response district. Knowledge of the company’s first due is the only sure way to be familiar with these types of structures.

2.2.3 These types of dwellings may vary in height from one to three stories. The grading surrounding the dwelling may affect the height.

2.2.4 These types of dwellings may be serviced by several utilities. Water, sewer, gas, electric, and communications systems are most often found within these occupancies.

2.2.5 There are several common types of single-family dwellings found in the Northern Virginia region: 1- story rambler or ranch, 1½-story Cape Cod, 2-story colonial, 2-story split level, 2-story split foyer, 2-story balloon frame, and 1 to 3- story unique designs.



### 3 CONSTRUCTION

#### 3.1 TYPES

3.1.1 Class 5, Wood Frame, is generally found throughout Northern Virginia. Some houses of ordinary construction may also be found.

3.1.2 Platform-frame construction is the most common type; however, there are many balloon-frame-constructed homes in some areas.

3.1.3 The use of lightweight trusses has become common place. The truss can be found in several applications in a single-family dwelling.

3.1.4 The most prudent action a company can take is to become familiar with the type of construction used during the building of homes in the response district.

#### 3.2 ROOFS

3.2.1 Roof framing for these structures generally falls into two broad types: conventional and lightweight.

3.2.2 Roof decking generally will be 4 X 8-foot sheathing. Dimensional lumber, typically 1 X 6 or 1 X 8-inch boards, may be found in older structures.

3.2.3 Roof covering will generally be shingle over paper, or a variation thereof. The vast majority is either asphalt shingles or cedar shakes.

3.2.4 The most common style of a roof is the peaked or gable roof, or variation thereof. The pitch on this type of roof may vary.

#### 3.3 ATTICS

3.3.1 Attics are generally of two styles. The attic space found when a roof is constructed of trusses is usually non-finished without a full floor. This space is commonly used for storage. The attic space found when a roof is constructed of rafters can be finished and floored. This space may be used for storage or as an occupied living area, usually a bedroom. In cape-cod style homes, the presence of knee walls should be suspected.

3.3.2 Most attics are used for storage only. Access can be gained by one of three ways: a scuttle located in the hallway outside the bedroom or in the master bedroom closet, a “pull-down” stairway, or a constructed stairway found mostly in older homes. Constructed stairways are normally accessed through a doorway and lead to a floored attic.

### 3.4 WALLS

3.4.1 Dimensional lumber, 2 X 4-inch in size, is generally used for framing in wall construction. Larger sizes may be found where added insulation is desired. Metal studs may occasionally be encountered.

3.4.2 Exterior sheathing of many types may be utilized. Insulated material or wood are common types of sheathing.

3.4.3 Exterior coverings may include wood, brick, vinyl, aluminum, and asbestos to name a few.

3.4.4 Interior coverings for walls are generally made of gypsum or “drywall” as it is commonly referred to. Lightweight paneling may also be found in some areas. Plaster and metal or wood lath wall construction may be encountered in some older homes.

3.4.5 The insulation material used within exterior walls is generally fiberglass. Wood cellulose, rigid plastic foam, or other blown-in material may also be found.

### 3.5 FLOORS

3.5.1 Floor beams are generally of two types: wood timbers or steel “I” beam. Wood or steel columns, or masonry walls or piers may support them.

3.5.2 Joists are generally of three types: dimensional lumber, truss, and plywood “I.” Dimensions will range in size depending on the length of the span and the load the truss will carry. The truss is designed to carry a load over the greatest span using the least amount of material.

3.5.3 Floor decking is generally of two types: hardwood boards or plywood sheets.

3.5.4 Floor covering may vary greatly depending on the builder’s constraints or the buyer’s preference. Common types are carpet, vinyl, or tile.

## 3.6 BASEMENTS

- 3.6.1 Single-family dwellings will be set on a concrete slab, have a crawl space, or full basement underneath. Basement entry may be from an exterior and/or interior stairway.
- 3.6.2 Slab and basement floors are commonly poured concrete. Crawlspace floors will usually be dirt or gravel.
- 3.6.3 Crawlspace and basement walls are generally built of block or poured concrete. If the basement is finished, wood or metal studs covered by drywall or paneling may be found.
- 3.6.4 Unfinished basements allow the fire to directly attack the structural components and quickly enter void spaces.

## 3.7 WINDOWS

- 3.7.1 A common style of windows utilized in single-family dwellings is a double-hung, sliding-sash type. The glazing may be of single, double, or triple thickness. Many other styles of windows may be found and should be noted during preplanning and size-up opportunities.
- 3.7.2 Casement windows create a special hazard. These types of windows are found in construction dating from the late 1940s to the late 1960s. These windows have steel frames set in concrete or masonry. While breaking all the glass in the windows will ventilate the affected area, entrance and exit through the remaining window frame is physically blocked. The window must be opened by lifting a latch and rotating a crank. Removing the frame with force would be very difficult under adverse conditions, and would require the use of heavy forcible entry tools. Firefighters should note these windows in their size-up upon arrival at a structure fire.

## 3.8 DOORS

- 3.8.1 Exterior doors are generally of two types: solid wood or insulated metal. Exterior doors are inward opening. Conventional forcible entry will gain access in most cases. The hydraulic door opener is not recommended on single-family dwellings because of its lack of practicality. It is designed for multiple, inward-opening doors. If conventional forcible entry is required, standard entry methods will accomplish the task.

3.8.2 Interior doors are commonly hollow-core wood doors. Inward opening doors are typically bedrooms and bathrooms. Outward opening doors can be closets or the stairs leading to the basement.

3.8.3 There are three standard locks on exterior, single-family dwelling doors. These are mortise, rim, and tubular dead bolt. Mortise locks used to be exclusive on older construction. Currently, it is the most prevalent lock in new construction.

### 3.9 GARAGES

3.9.1 Garages may be attached to or detached from a single-family dwelling. The attached being of a greater concern to operations, as it exposes the entire structure to possible extension from a fire originating in a garage.

3.9.2 Garage floors will be of poured reinforced concrete, and may have a short masonry block wall on some of the sides.

3.9.3 The remainder of the garage will be constructed in the same manner as the dwelling it is attached to. This is most commonly wood frame construction.

3.9.4 The party wall shared by the garage and the living area is not required to be fire-rated, and should not be considered as such.

3.9.5 The door from the garage to the living area is not required to be fire-rated, or self-closing.

3.9.6 The attic of the garage may not be floored and/or finished. A vehicle or contents fire in a garage with an unfinished attic will allow for rapid fire extension to other areas of the structure. The presence of a finished living area over the garage presents a serious life hazard.

3.9.7 The overhead entrance door to the garage and its mounting hardware will not be fire-rated. These types of doors are known to collapse when left open and exposed to fire.

### 3.10 GENERAL FEATURES

- 3.10.1 Interior stairways may be open from the lowest living level to the highest. The type varies, but the most common is a straight run, vertically stacked stairway.
- 3.10.2 Despite the vast range of total square footage available in single family dwellings, the degree of compartmentation is commonly such that the individual compartments are relatively small.
- 3.10.3 Most single-family dwellings have four sides and are rectangular in shape. Two parallel exterior walls are load bearing and the other two are not. There is generally one interior load-bearing wall located centrally between, and parallel to, the exterior bearing walls. Except for unusual circumstances, the long wall will be the load-bearing wall.
- 3.10.4 Fireplaces and chimneys may be found in these types of dwellings. These may be constructed of masonry or metal, each having particular inherent hazards. The fireplace and/or chimney may be in the center of the structure, or as part of an exterior wall.

## 4 HAZARDS

### 4.1 LIFE HAZARDS

4.1.1 As stated in the introduction, most deaths, related to structure fires, occur in single-family dwellings. This fact indicates the priority life safety has, when dealing with this type of occupancy and thus, the need for speed in executing tactics.

4.1.2 The potential for trapped occupants exists at all times (day or night) in a single-family dwelling. During the period when occupants may be sleeping, their chance of survival is decreased due to their inability to quickly detect and flee from a fire.

4.1.3 The location of the fire in this type of dwelling affects the life hazard. Most fires in single-family dwellings start in the vicinity of cooking **or** heating appliances. This situation directly exposes the fire floor and those floors above (basically the entire home) and more important, the bedrooms.

4.1.4 The age, physical, and mental abilities of the occupants affect the life hazard. It is common to find people with varying degrees of mobility within single-family dwellings.

4.1.5 The intended use of a single-family dwelling is for a place of residence. The possibility exists that the occupants may not be using the home as intended, therefore, creating other hazards that affect life safety such as a day care center or a clandestine drug lab.

### 4.2 FIRE HAZARDS

4.2.1 The fact that single-family dwellings are generally constructed of wood adds greatly to the fire hazard.

4.2.2 The use of combustible interior finishes and the type of furnishings found within these structures, contributes to the fire loading. Generally, these types of occupancies are considered to have a relatively "low" fire loading. Fire flow estimates will be based on a flow rate of 10 gpm per 100 square feet of involved area. Therefore, attack lines should be 1-¾ inches in size.

4.2.3 The presence of highly combustible siding can greatly affect the fire hazard. Vinyl and asphalt siding may contribute to vertical and horizontal fire spread, and creates a severe exterior exposure problem.



- 4.2.4 The presence of interior void spaces may add to fire spread. Vertical and horizontal openings allow smoke and fire to enter and attack the structure itself. Fire that has entered these voids will necessitate the opening of floors, ceilings, and walls. This is especially crucial in balloon-frame construction.
- 4.2.5 The presence of cooking, utility, and mechanical areas creates the potential for fire. It should also be recognized that in the residential setting, the potential for ignition exists from many sources that include space heaters, pilot lights and burners, and smoking materials.
- 4.2.6 The presence of fireplaces and chimneys may create a potential for fire extension to unwanted areas of the structure. As improper installation or time may compromise the integrity of the components, allowing fire or heat to escape and ignite surrounding combustible members.
- 4.3 OTHER HAZARDS
- 4.3.1 The potential exists for flashover to occur in these types of structures. The amount and type of combustible materials, rate of heat release of the burning materials, and an adequate supply of oxygen allow a fire to progress rapidly to the flashover stage.
- 4.3.2 The potential for collapse in single-family dwellings as a result of fire is related to two distinct factors. (1) The presence or absence of lightweight construction materials and, (2) whether the fire is attacking the structural components or contents only. The greatest collapse potential exists when fire is in the basement attacking the vital structural supports under the first floor. Since there may be no walls or partitions in the basement, large portions of the first floor can collapse into the basement fire area. This condition is exacerbated if plywood "I" beams or other lightweight components are involved.
- 4.3.3 The presence of overhead electrical service wires to the dwelling should be suspected and their integrity assessed. The hazard of this service dropping into the yard is a common one. Should this occur, the incident commander must be advised and all companies operating made aware.

## 5 FIRE OPERATIONS

### 5.1 STRATEGIC FACTORS

5.1.1 Life safety is the highest priority at all structure fires. However, the potential for life loss is most prominent in residential occupancies. This objective should be achieved through aggressive interior fire containment and primary search. All operational tactics should be assigned to support this strategic goal.

5.1.2 When it has been confirmed that the occupants of the structure are accounted for, self evacuated, evacuated with assistance, or rescued, the strategic goal should then focus on firefighter safety and fire extinguishment.

5.1.3 In most cases fire extinguishment should be achieved through an offensive interior attack. At times, size-up will indicate otherwise; however, personnel should anticipate an offensive interior attack.

5.1.4 The conservation of property should be a strategic goal throughout the entire incident.

5.1.5 The rescue problem should be addressed through an aggressive interior primary search for life that focuses on the area near the fire, as well as the bedrooms and means of egress. Ventilation in this type of structure is critical in facilitating a primary search. This may be achieved through the aggressive removal or opening of selected windows where occupants might be located.

5.1.6 If the EMS unit is staffed with members trained as firefighters and there is no need for the treatment of trapped or injured occupants, this unit may be used as the "outside two," or assigned to other duties as determined by the incident commander. If this action is taken, another EMS unit shall be requested to the incident for the treatment of injured firefighters or occupants.

5.1.7 The interior exposure problem should be addressed through rapid containment of the fire. This must include advancement of an interior attack line to protect any occupants within the structure, focusing on the interior stairway if present or other vertical voids. The interior fire will be of two types: fires involving only the contents or fires that involve the contents as well as structural members. The latter scenario provides the means for fire to extend throughout the structure.

- 5.1.8 The exterior exposure problem should be addressed through an aggressive offensive interior attack, an offensive exterior attack, or by protecting the exposures with a defensive attack.
- 5.1.9 The confinement of the fire should be achieved through the rapid advancement of an interior attack line to protect the interior stairway and advance to the seat of the fire. If it cannot be ensured that rapid extinguishment will be achieved, then it is imperative that the hose line(s) is located in such a way as to protect the victims.
- 5.1.10 The extinguishment of the fire should be achieved through the proper selection, placement, and application of the attack line(s). The compartmentation generally found within single-family dwellings and the fire loading suggests that the 1¾-inch attack line should be effective in extinguishing most content fires. Fires involving structures of this type of occupancy may require the support of several equally effective and mobile lines.
- 5.1.11 The ventilation of this type of structure during a fire should generally be achieved through natural horizontal methods. The reason for venting should be identified and communicated to the assigned units.
- 5.1.12 The need for roof openings typically will only be required when the fire has entered the attic area or has gained access to vertical void spaces. Conventional construction provides the needed support to accomplish rooftop ventilation. Lightweight construction does not provide the support necessary and may result in early collapse. Crews ordered to perform rooftop ventilation in lightweight construction should be independently supported by the use of aerial devices.
- 5.1.13 Fire travel within these types of structures will be affected by the method of construction. Balloon-frame and platform-frame construction methods are common, and each presents a different concern. Balloon-frame construction requires the checking of all levels within the structure. Fire should be suspected of having entered the exterior walls. Platform construction offers some level of fire-stopping, but all affected vertical voids must still be checked for the presence of fire with attention given to the plumbing and heating areas.

## 5.2 RESOURCES FOR FIRES IN SINGLE-FAMILY DWELLINGS

5.2.1 The minimum resources assigned to incidents of reported fires in these types of structures are:

- 4 Engine Companies
- 1 Truck Company
- 1 Rescue Company or 2<sup>nd</sup> truck
- 1 EMS Unit
- 1 Battalion Chief

5.2.2 The assigned resources for fires in single-family dwellings in areas without hydrants should be modified to include:

- 1 Tanker
- 1 Tanker Support Engine Company

5.2.3 The 4<sup>th</sup> due engine shall assume the role of the Rapid Intervention Team (R.I.T.), unless otherwise assigned by the Incident Commander.

5.2.4 When reports of occupants trapped are received, the assigned resources should be modified to include ALS units, if not already dispatched.

5.2.5 Utility-fueled fires will require the assistance of the involved utility company.

5.2.6 The rehabilitation of companies that have been operating may require additional resources for relief as well as to staff "rehab".

5.2.7 Units encountering delays in responding should communicate this immediately, along with changes in arrival order that will affect assignments. The dispatcher should notify the responding chief officer of these changes. The chief officer should be advised of and acknowledge companies becoming available and being added to the incident.

5.2.8 Reserve resources should be available in staging to meet contingencies as they occur until the fire is declared under control.

## 5.3 APPARATUS POSITIONING FOR FIRES IN SINGLE-FAMILY DWELLINGS

5.3.1 Typical positions and initial actions are listed below:

- First due engine – pull past the involved structure or stop short, allowing room for the truck to have the front; on-scene report, layout, size-up, situation report, initial attack line, search as the line is advanced.
- Second due engine – water supply, back up line.
- Third due engine – secondary water supply, check for fire extension, visual inspection of side C, and possible exposure line.
- Fourth due engine – R I T
- First due truck – position in front of structure; force entry if needed, search, ventilation, ladders
- Rescue or 2<sup>nd</sup> truck – Position away from structure; force entry if needed, search, ventilation, ladders. (See Truck and Rescue Company Tactics for more detail).

5.3.2 After viewing as many sides as possible, the first due engine company should park in a position to allow for rapid advancement of hose lines into the structure, leaving priority position for the truck company. In most cases this will mean that the first engine pulls past the involved structure.

5.3.3 The first due truck company shall take a position at the most strategic location that will allow for rapid placement of ladders (front and rear), and entry into the structure.

5.3.4 The second due engine shall ensure that a water supply is established.

5.3.5 The third due engine shall position to allow the crew rapid access to the structure while maintaining access and egress to the incident for additional resources. The engine should position to provide a secondary water supply if necessary.

5.3.6 The fourth due engine shall position the apparatus out of the way so as to not block access for incoming trucks, and assume the position of R I T. If needed, the driver may be assigned to supply water for the 3<sup>rd</sup> engine.

5.3.7 The rescue company should position to allow rapid access to the structure while maintaining access and egress to the incident, for additional resources.

5.3.8 The EMS unit should position in an area that will not block fire apparatus, and allow for unimpeded egress from the scene in the event patient transport is necessary.

- 5.3.9 The chief officer shall position the vehicle without blocking firefighting units, but in a position that will allow effective command of the incident.
- 5.3.10 The units staging should operate as outlined in the Incident Management System (I.M.S.) manual.

## 6 ENGINE COMPANY TACTICS

### 6.1 WATER SUPPLY

6.1.1 When dispatched for a fire in a single-family dwelling, the first arriving engine will lay supply line(s) to establish the water supply for an offensive interior attack. The location and method of the hose lay should be communicated to the second due engine company.

6.1.2 A forward (or straight) hose lay of a supply line(s) shall be used when possible. Modifications to this procedure may be made to ensure sufficient fire flow to extinguish the fire.

6.1.3 In areas where hydrants are not readily available, the procedure for relay or shuttle operations will be followed.

### 6.2 ON-SCENE REPORT

6.2.1 The first due unit officer shall include the following information in the on-scene report:

- Water supply/layout location (if not previously reported)
- Type of structure
- What is evident

### 6.3 SIZE-UP AND SITUATION REPORT

6.3.1 The first due engine officer should attempt to view all sides of the structure, noting location and extent of smoke and fire, rescues, access points, utilities, and exposures.

6.3.2 The information gathered from the size-up will dictate the mode of operation, action plan, and tactics employed. The size-up results are reported through the situation report, which shall include command statement, initial assignments, and requests for greater alarms. Progress reports will follow.

6.3.3 Should interior operations be initiated, the first engine company will begin operations following departmental two-in/two-out guidelines.

## 6.4 INITIAL LINE

- 6.4.1 The initial attack line for most fires within this type of structure will be the 1¾-inch pre-connect, allowing for the needed speed, mobility, and fire flow. The first due engine crew will usually be responsible for deploying this line. An exception might be when the unit arrives alone, and an obvious need for an immediate rescue is indicated.
- 6.4.2 The advancement of the initial attack line will generally be through the front door of the structure. In most cases, the hose line will be charged prior to entering. The attack should be made from the unburned portion of the structure toward the seat of the fire. This may dictate entrance from a location other than the front door. The first due engine will normally accomplish entry on its own. However, the forcible entry task, when needed, remains the responsibility of the first due truck or rescue.
- 6.4.3 The purpose of the initial attack line is to protect occupants, the interior stairway, and if possible, advance to the seat of the fire for confinement and extinguishment.
- 6.4.4 The conditions found upon arrival and the information gained during the size-up, may dictate changes in these tactics.

## 6.5 BACK-UP LINE

- 6.5.1 The back-up line for most fires within these types of structures will be the 1¾-inch pre-connect, allowing for the needed speed, mobility, and fire flow. The line should be of sufficient length to reach the location of the initial attack line or to be advanced to the area above the fire, if required.
- 6.5.2 The second line will generally be stretched from the first-arriving engine company apparatus. In most cases, the second arriving engine company will accomplish this task.
- 6.5.3 This line shall be capable of delivering a greater amount of water than the initial line. In the case of a 1¾-inch line, adjustments will have to be made to produce the higher flow. The need for advancement will be determined by the progress of the initial attack line. If the back-up line is not needed to support the attack line, it may be used as the line above the fire. Command must be informed.

## 6.6 LINE ABOVE THE FIRE

6.6.1 Officers should consider an additional hose line for operations above the fire. There are two purposes of the line above the fire. The first is to protect the company doing the primary search of the floor above and the second is to extinguish vertical extension.

6.6.2 **No more than two hose lines shall be stretched through any one entrance into a building.** The advancement of additional lines should incorporate alternate means of entry.

6.6.3 The line assigned to the floor above the fire in these types of structures will generally be the 1¾-inch pre-connect, allowing for the needed speed, mobility, and fire flow.

6.6.4 This line should be of sufficient length to reach the area above the fire and into the attic, if required. Often the third-due engine company will be responsible for this task. The unit this line is deployed from will be determined by the incident commander, or assigned unit officer.

## 6.7 BASEMENT FIRES

6.7.1 Size up at a basement fire is critical to the success of the operation. The location and extent of the fire, building construction, as well as points of access to the basement must be determined early. If the fire is known to be in the basement, the officer must quickly determine if an exterior access to the basement is present. This exterior door most often will be in the rear.

6.7.2 The objective, when attacking a basement fire, is to keep the fire from extending vertically by containment and extinguishment. This will require two lines. The need for both lines to be coordinated and rapidly get into position is of utmost importance in these types of fires.

6.7.3 The first line should be stretched to the first floor to contain the fire and protect the occupants and searching firefighters by closing the basement door or using a fog pattern aimed at the ceiling over the stairway. It is imperative that this fog stream NOT be directed downward into the stairwell. The interior basement stairs are normally located under the stairs to the second floor and face the rear of the structure. The officer of this line must carefully size-up the structural integrity when determining if the line should be positioned at the top of the stairs or in a position closer to the entrance door.

- 6.7.4 The second line shall be stretched to the exterior doorway for attack. This stream should be a straight or solid stream to avoid forcing fire, heat, products of combustion, and steam up into the first floor. The exterior attack line shall not begin the attack until it has been confirmed that the first line is in position and ready. The preferred point of attack is the exterior door that leads directly into the basement.
- 6.7.5 Basement fires sometimes need to be attacked with the first line going down the interior stairs. This may be necessary because an exterior entrance into the basement is not accessible, or there may be no entrance at all. Under these circumstances, the officer will need to determine if it is safe to attempt going down the basement stairs for a direct attack on the fire. The officer must carefully evaluate the structural stability, life hazard, and the fire and heat conditions at the top of the stairs. Good judgment must be exercised in deciding if it is safe to proceed down the stairs. In this case, the second line shall back up the first line.
- 6.7.6 **If only one line is available**, or fire or structural conditions do not permit the first line to go to the first floor, then the first line should be stretched to the exterior doorway for attack. After the fire has been knocked down from the exterior entrance to the basement and the first floor is deemed safe for entry, the second line shall be brought to the first floor to extinguish any vertical extension on the floors above. The officer of this line must carefully size-up the structural integrity in determining where or if the line should be positioned on the floor above the fire. This line has two objectives, extinguish any fire that has extended upward and to protect searching firefighters.
- 6.7.7 Occasionally, heavy fire conditions are encountered that prevent an attack from the first floor and there is no exterior entrance to the basement. An option that officers can exercise is that of knocking the fire down from outside the basement. This can be accomplished by applying a fire stream into the basement through a window opening. In most cases, this stream should be a straight or solid stream to avoid forcing fire, heat, products of combustion, and steam up into the first floor. Another option would be to cut a hole in the floor above and operate a fog or distributor nozzle. In either case, officers must ensure that no firefighters have entered the basement and that the application of the stream is simply to knock the fire down so that entry can be made.
- 6.7.8 Should a basement fire occur in a balloon-frame structure, early attention should be given to checking for extension through the stud spaces in the exterior walls. Fire should be expected to extend to all floors and the attic.

6.7.9 The advancement of lines for an interior attack of a basement fire must be coordinated with aggressive ventilation of the basement and floors above.

## 6.8 GARAGE FIRES

6.8.1 The objective when attacking fires that originate in an attached garage is to confine and extinguish the fire from the unburned area of the structure, secure the overhead door in the open position, and prevent extension of the fire to the living area.

6.8.2 The need for quick assessment of extension into the living area and attic is imperative. The attached garage fire is known for its ability to extend to upper floors and the attic. The need for companies to check these areas and have charged lines to support them is crucial.

6.8.3 The garage may be located under a living area. This area must be quickly checked for smoke and fire spread. Companies operating in this area should be cautious, as the fire below them has direct access to the floor members supporting them.

6.8.4 The fact that a garage may have two means of access offers two alternatives that may be utilized to proceed to the seat of the fire.

6.8.5 When the initial line is advanced through the overhead door, the status of the door leading to the living area must be known. This door must be closed and protected to prevent the spread of fire and/or smoke to the interior of the house. A hose line must also be advanced through the house to the garage door to prevent extension. The fire attack must utilize a straight or solid stream to prevent the fire and products of combustion from being driven into the main portion of the house.

6.8.6 If the decision was made to advance the initial line through the living area of the structure for the attack, the engine company must be ready to operate the line when the door is opened. If this door was left open at the time of the fire, the advancing engine company should anticipate encountering fire in the living area near that door. A second line should be advanced to back up the first or to proceed to the upper floors.

6.8.7 Many times the fire will have originated in a vehicle parked within the garage. Standard precautions associated with all vehicle fires, such as exploding bumper cylinders or ruptured fuel tanks, should be observed. An option may be to breach an exterior wall to accomplish initial knockdown.

6.8.8 Breaching the overhead door in the center about three quarters of the way up from the bottom, can at times provide access to the overhead door manual release. If the manual pull cord is still intact, it may be within reach of the opening made in the door. Pull the cord to disengage the door from the motor, and allowing the door to then be raised.

## 6.9 ATTIC FIRES

6.9.1 Fires in the attic of a single-family dwelling are a result of fire originating in one of several areas. These areas or situations include:

- The living area or basement that has extended into the structural components and enters the attic via void spaces.
- Interior fire that has vented through a window and exposes the vented soffit area.
- Fire that has originated on the exterior of the dwelling and has involved the siding and exposes the soffit area.
- Fire that has originated in the attic itself by natural occurrences such as lightning strikes, electrical, or mechanical malfunction.

6.9.2 Tactics involving fire in the attic will vary to some extent based on the location of the seat of the fire. In the case where fire has originated in the living space or basement, the fire will have to be controlled based on an aggressive interior attack on the seat of the fire followed by hooking voids and ceiling to expose hidden fire in voids and the fire in the attic. These fires may be controlled by one line in the area of fire origin, or normally will require extensive hooking and multiple lines to extinguish depending on the amount of extension and spread.

6.9.3 In some situations, fire exposes the soffit area under the eaves which is vented into the attic. This can be caused from fire blowing out windows, a doorway below, or from a fire that originated on the exterior of the structure. In these cases, the first task is to conduct a quick sweep of the soffit and eave line with a hose stream. This quick sweep is intended to knock down fire extending into the attic through the soffit vents. The steam conversion drawn into the attic area can help deter fire advancement to this area before an attack on the seat of the fire is commenced.

- 6.9.4 When encountering fire in the attic only, with no involvement of the living space, unit officers must consider the following as operations commence.
- 6.9.4.1 At this time the occupant's personal belongings in the living space are not involved in the fire.
- 6.9.4.2 Conditions may be very tenable in the living area, even when there is extensive fire above.
- 6.9.4.3 At this point there is high heat and fire in an unoccupied, relatively confined area. A hose stream utilizing a fog pattern is indicated in this instance. Crews will want to use an attic scuttle if readily available, or poke a small hole for placement of the nozzle. Flow the fog pattern for several seconds. The fire should darken down due to the steam conversion and expansion. Avoid flowing the nozzle too long, or the ceiling may become saturated and collapse into the living area.
- 6.9.4.4 The intent of this approach to attic fires is to rapidly knock down the bulk of fire in the attic area until primary search, vertical ventilation, and salvage operations are completed. Extensive ceiling removal may still be required to check for extension, expose pockets of fire, or for the removal of blown in insulation. However, this tactic can "buy" crews the time to search the occupancy and deploy salvage covers without pulling the fire down into to the living space
- 6.9.4.5 **If the attic area has a floor, the nozzle stream will normally not be able to penetrate the attic. In these instances, the officer should look for a pull-down or constructed stairway. If no stairway is found, consider opening the ceiling within approximately 2 feet of the exterior wall where the pitched roof eaves terminate. This area is often not floored due to its inaccessibility and lack of storage space.**
- 6.9.4.6 Pull-down attic stairs shall not be used where fire has been present. These stairs are typically rated to only 250 pounds. Their integrity due to exposure to fire is questionable. A FD attic ladder may be needed, however in most situations the nozzle can be advanced through the opening in the 8-foot ceiling without ladders.
- 6.9.4.7 Attacking the fire through an exterior gable vent should be considered when access to the attic area from the interior would be too time consuming due to the presence of flooring in the attic. Breaching the siding for nozzle access is also an option when interior access is not possible. A piercing nozzle, which typically flows over 100 gpm, is also an option, but the reach of its stream is very limited.
- 6.9.4.8 Aggressive salvage operations and primary search should be ordered as the hose

line is being deployed.

- 6.9.5 The interior officer should request a report from the command officer on the exterior to convey their observations as the fog stream is being deployed. For example, a report of heavy steam production would indicate that the stream is effective.
- 6.9.6 A roof collapse hazard is present in the single-family dwelling. However, it is not as significant as in a commercial structure where large expanses of ceiling and roof support members are present.
- 6.9.7 Members should be aware of the presence of furnaces and hot water heaters in the unfinished attic areas. This is prevalent in larger homes with multi zone HVAC systems.

## 7 TRUCK AND RESCUE COMPANY TACTICS

**NOTE:** The rescue and truck company's functional duties on a single-family dwelling fire closely parallel one another. Tasks assigned such as a search for victims and location of the fire, forcible entry, ventilation, and control of utilities, may be carried out by either of these units. Assignments specific to the truck would **normally** involve laddering. Success in preserving life and property hinges on the proficiency of the members performing these duties. If a second truck is sent on a house fire response in lieu of a rescue, the **second truck** will assume duties assigned to the **rescue** as described in this section.

### 7.1 POSITIONING

- 7.1.1 The preferred position for the truck company at fires in single-family dwellings will be the front of the structure with deployment of ground ladders as a primary concern.
- 7.1.2 The position of the rescue company at fires in single-family dwellings will generally be one that affords rapid access to the structure, but does not block other companies.
- 7.1.3 Other units responding on the incident shall keep the front of the structure open for the truck. Units arriving after the truck should be cognizant of the possible need for access to the ground ladders, and keep the rear open at least 50 feet for ground ladder deployment.
- 7.1.4 It is recognized that there are circumstances that will prevent units from positioning as preferred. At times, only one engine will be able to position in close proximity to the structure, as is the case with a home located at the end of a long narrow driveway.

### 7.2 INITIAL ACTIONS

- 7.2.1 The initial actions of the first arriving truck or rescue will be determined by the plan of action developed from the size-up. After ensuring entry, these initial actions will generally be tactics focusing simultaneously on primary search and ventilation. Ventilation must be done to support the search as well as the advance of the attack.

- 7.2.2 The initial actions of the truck and rescue company will depend on their arrival sequence. Should the rescue company arrive at the same time as the truck, the rescue company will generally be assigned the task of entry and primary search and the truck is responsible for laddering and outside ventilation.
- 7.2.3 When only the truck or the rescue is on the scene, the officer may have to split the crew. The tasks of search and ventilation must be accomplished simultaneously requiring the crew to split with a member venting from the exterior while the officer and other member conduct the primary search inside.
- 7.2.4 Upon arrival of the other unit, this officer is responsible for ensuring laddering and outside ventilation is accomplished.
- 7.2.5 Certain size-up factors (untenable conditions, signs of backdraft, or smoldering stage, etc.) may indicate the need for ventilation prior to entry into the structure. When these conditions are observed the fire shall be vented prior to entrance into the structure. Before venting, the initial charged line must be in place and ready. In most cases, ventilation should occur from the top down using the removal of windows as the avenue for hot gases to escape. If ladders are used to remove upper-story windows, consideration should be given to leaving one or more in place. This allows the advantage of interior crews seeing the ladder placement prior to entrance into the structure. Paths of ingress should also be forced, but not opened.
- 7.3 **FORCIBLE ENTRY**
- 7.3.1 The purpose of entry will be to initiate a primary search and allow access for the advancing engine company.
- 7.3.2 The task of gaining entry into single-family dwellings will generally be easily achieved using basic conventional methods.
- 7.3.3 The access point for the engine company will almost always be the front door. This location may be altered due to the location of the fire, in an effort to attack from the unburned part of the structure. In situations where the front door is not the primary access point, it should still be opened for safety purposes.

## 7.4 RESCUE AND PRIMARY SEARCH

- 7.4.1 The area close to the fire on the fire floor and the area directly above the fire, are considered to be the two most *dangerous* areas. Means of egress and sleeping areas are generally considered to be the most *critical* areas to search. The objective in a primary search will be to check these areas first. Various means may be used to arrive at these locations. Support for the primary search should include ladders to upper-story bedroom windows and hose lines engaged on the fire.
- 7.4.2 The task of executing the primary search should be accomplished quickly due to relatively small areas within most single-family dwellings. As the area to be searched increases in relation to size of the structure, there must be an equal increase in the resources to accomplish the task. This need must be identified early, and requested immediately.
- 7.4.3 When accessing the fire floor, crews should begin the search as they make their way to the fire area. Crews going to the floor above the fire must also begin searching immediately, but with the objective of quickly getting to the area over the fire first, and then searching outward from that point.
- 7.4.4 Should the tactic of vent, enter and search (V.E.S.) be used to search the bedrooms, the incident commander must be notified to avoid duplication of effort and possible injury.
- 7.4.5 The outcome of the primary search must be reported to the incident commander because this is the primary strategic focus of the operation.

## 7.5 VENTILATION

- 7.5.1 Ventilation is performed either to support a search, “venting for life” or support the fire attack, “venting for fire”. This strategic decision will determine the method, location and timing of ventilation.
- 7.5.2 “Venting for life” will be accomplished through the aggressive removal of windows where appropriate. The areas of reported or suspected occupants should be addressed first. This must be immediately followed by a search of that particular area.

7.5.3 In most cases, ventilation is accomplished simultaneously with search and is sometimes required PRIOR to the commencement of the search. Therefore, ventilation must be coordinated with the search. Ventilation coordinated with an aggressive primary search can improve the survivability of victims because it:

- Reduces heat and smoke on the interior.
- Reduces potential for flashover.
- Allows firefighters to search faster and more effectively.
- Allows for locating the fire more rapidly.

7.5.4 “Venting for fire” will be accomplished through the coordinated and limited removal or opening of windows in the fire area. The areas where fire can be seen or are showing the highest concentration of smoke should be opened when the attack line is in position to confine the fire.

7.5.5 The need for rooftop ventilation in a single-family dwelling will depend on the extent and location of the fire. Generally, the roof will not need to be ventilated unless the fire has entered the attic area, extended into the structure walls, or has considerable hold of the top floor.

7.5.6 Vertical, rooftop ventilation should be accomplished through common methods, when ordered by command. The discovery of a lightweight trussed roof should be made known and reacted to appropriately. Members MUST be independently supported when operating on lightweight construction. A viable and safer option is to vent the ends of a gable roof.

7.5.7 Mechanical and positive pressure ventilation (PPV) works well for smoke removal in these types of structures. PPV shall NOT be used in balloon-frame construction.

## 7.6 LADDER DEPLOYMENT

7.6.1 The purpose of laddering is to provide access into the dwelling, and an escape route for firefighters operating within.

7.6.2 Laddering at a fire in a single-family dwelling should be done to the front and rear of all floors above ground level, with attention given to the bedroom windows. This can generally be accomplished with ladders of 35 feet or less that are found on most apparatus at the incident scene.

7.6.3 The need to ladder the roof at a fire in a single-family dwelling will depend on the extent and location of the fire. Generally, the roof will not need to be laddered unless the fire has entered the attic area, extended into the structure walls, nor has considerable hold of the top floor.

## 7.8 BASEMENT FIRES

7.8.1 The interior crew will provide support for the initial line regardless of where attack begins. If the initial line is to enter from the front, this crew will force entry, locate the basement stairs, and assess severity of fire. The truck shall carry out the tasks of venting and search in support of the attack. The crew must monitor radio traffic to ensure they are aware of the direction of the attack and any information transmitted regarding fire extension and structural stability.

Priority should be given to the sleeping areas and **consideration for V.E.S. must be given** if fire has possession of the stairs or the first floor is untenable.