

DETAILED LESSON OUTLINE

COURSE: Fire Operations in the Wildland/Urban Interface, S-215

UNIT: 5 - Structure Protection Tactics

LESSON: A - Initial Operations and Site Preparation

TIME FRAME: 2 hours

TRAINING AIDS: Flip charts; personal computer with projector and electronic presentation on CD or overhead projector and screen with overhead transparencies; Incident Response Pocket Guide PMS 461 (NFES 1077); "Wildfire Preventing Home Ignitions" video tape

OBJECTIVES:

1. Identify lessons learned in structure protection.
2. List initial operations to be accomplished upon arrival at an incident or assigned area and describe their importance to firefighting actions.
3. Describe how to prepare structures and the surrounding area to minimize damage.

OUTLINE	AIDS & CUES
PRESENT LESSON OBJECTIVES.	5A-01-S215-EP 5A-02-S215-EP SW p. 5A.1
I. INTRODUCTION	
Structure protection can involve the use of both defensive and offensive tactics.	5A-03-S215-EP SW p. 5A.2
A. Actions taken prior to the arrival of the fire: site and structure preparation.	
B. Actions taken as the fire front arrives: structure defense.	

OUTLINE	AIDS & CUES
<p>C. Actions taken after the fire front passes: secure structure and begin mop-up activities.</p>	
<p>II. STRUCTURE PROTECTION: LESSONS LEARNED</p>	<p>5A-04-S215-EP SW p. 5A.2</p>
<p>A. Tactics employed in structure protection are the same for both wildland and structural firefighting agencies regardless of the type of resources utilized.</p>	
<p>B. Most interface fires occur under high wind conditions, creating rapidly moving fires, extreme fire behavior, long range spotting and multiple fire fronts.</p>	
<p>C. The scattered location of structures in the interface can limit tactics commonly used in wildland firefighting, such as direct attack or burnouts.</p>	
<p>D. Spot fires create multiple fire fronts and firefighters protecting structures are often surrounded by flames, showered by burning embers and are subjected to dense smoke during the battle to save someone's home.</p>	<p>5A-05-S215-EP</p>
<p>E. Escape routes and safety zones are easily compromised in structure defense by remaining at the structure beyond what we would consider safe in wildland fire operations.</p>	

OUTLINE	AIDS & CUES
<p>F. Mobility is one of the most important tactics employed in structure defense.</p> <p>Engines must be able to quickly move from house to house in the protection effort. Structure engines are larger and less mobile than wildland engines.</p> <p>Consider actions in the deployment of firefighting equipment that will allow for rapid response to the changing fire environment, as well as maintaining the ability to escape to a safety zone.</p>	<p>SW p. 5A.3</p>
<p>G. Wise water use is critical to structural defense.</p> <p>Water may be most effectively used in foam solutions to wet down structural exposures prior to the arrival of the fire front.</p>	
<p>H. Coordination, organization and communications may not be adequate during initial operations.</p>	<p>5A-06-S215-EP</p>
<p>I. Resources required may not be available and those on scene may not be able to control the spreading fire. Resources defending structures must be mobile, resourceful, and self-reliant.</p>	
<p>J. The ability to communicate among all agencies responding to interface fires is an absolute must. Regular communication among all resources is essential.</p>	
<p>K. Situational awareness is required due to the numerous factors that can quickly compromise the safety of everyone involved.</p>	<p>IRPG p. 11</p>

OUTLINE	AIDS & CUES
<p>2. Command, control, and accountability</p> <ul style="list-style-type: none"> • Maintain contact with all units on scene and your local dispatch office, establish separate command and tactical radio frequencies if needed to organize communications. • Provide an initial size up with all required elements. This is critical for ensuring that dispatch offices understand the fire situation, provide incoming units with information on routes of travel, initial assignments and ordering additional resources. • Establish a staging area for incoming units that is large, easy to access and located in an area that will not be compromised by the spreading fire. Designate a staging area manager to coordinate incoming resources and provide information on resource availability. • Do not locate the incident command post at the staging area to minimize distractions to the incident management team. 	<p>5A-09-S215-EP SW p. 5A.4</p>

OUTLINE	AIDS & CUES
<p data-bbox="284 285 711 317">B. Homeowner Contacts</p> <p data-bbox="386 375 1097 541">Some residents are ready to flee at the first sight of smoke. Others will want stay with their homes. You will need to provide advice and direction.</p> <p data-bbox="381 598 708 630">1. Shelter in place</p> <p data-bbox="475 688 1097 940">a. Residents that remain can be helpful. They may know the locations of other structures, water sources, access routes, hazards, etc. They can help prepare their home before the fire hits.</p> <p data-bbox="475 999 1110 1339">b. Homeowners who remain should be advised on basic safety considerations. Be alert to equipment. Do not go out into unburned fuel. Know the escape routes and safe zones. If trapped by the fire, remain in the structure until it is safe to exit.</p> <p data-bbox="475 1398 1110 1696">c. The checklist “Caught in a Wildfire” is a handout that may be given to homeowners. The checklist includes actions to be done inside and outside the house, proper clothing to wear, and other guidelines for family safety.</p>	<p data-bbox="1154 285 1393 365">5A-10-S215-EP SW p. 5A.5</p> <p data-bbox="1154 1398 1393 1478">5A-01-S215-IR 5A-01-S215-SR</p>

OUTLINE	AIDS & CUES
<p>d. Shelter in place may put citizens at risk and may interfere with operations. Consider the additional stress remaining homeowners put on firefighters to stay longer than safety permits.</p> <p>2. Evacuation</p>	
<p>ADDRESS LOCAL EVACUATION AUTHORITY.</p> <p>Usually the responsibility of law enforcement agencies. States may have different laws.</p> <p>Example: Wyoming State Statute 35-9-116 states in part, “In the event of a hazard of immediate life threatening severity, the state fire marshal or the chief of a fire department or district may order evacuation of a building or area and may implement emergency measures to protect life and property and to remove the hazard.”</p> <p>a. Evacuation may be required to clear the area for firefighting operations and to minimize risk to citizens. We can ask people to evacuate, but only law enforcement officers have the authority to make them leave.</p>	<p>SW p. 5A.5</p>

OUTLINE	AIDS & CUES
<p>b. Advise evacuees to take a minimum of belongings with them. Suggest they close-up, but not lock their residences. Direct them to the appropriate route, to watch for incoming equipment, and to any location where they are to gather.</p>	
<p>C. Routing Traffic and Establishing Access</p> <ol style="list-style-type: none"> 1. Request assistance from local law enforcement for traffic control. If law enforcement is not on scene, delegate traffic control to someone. Use flares, emergency lights and other visible safety warning devices at all times. Coordinate traffic control with law enforcement when they arrive on scene. 2. You may encounter narrow access roads already filled with, and even blocked by local traffic. 3. Develop a traffic plan and communicate the information to all units and dispatch. Identify routes into and out of the area with signs or flagging. 	<p>5A-11-S215-EP SW p. 5A.6</p>
<ol style="list-style-type: none"> 4. Clear existing traffic to make way for fire equipment. Alternatively, direct civilian traffic to the roadside until fire equipment has passed, and tell them when they can move out. 5. Leave a clear path for other incoming units. Note weight limits or bottlenecks that may limit some equipment. 	<p>5A-12-S215-EP</p>

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<p>IV. STRUCTURE AND SITE PREPARATION</p> <p>If there is any time available before the fire reaches a structure, much can be done to improve the chances of saving the structure.</p> <p>Site preparation depends upon the time and assistance you have prior to the fire's approach.</p> <p>Initial attack on interface fires offers little time for preparation. Often all that can be done is to get an engine to the structure and position hose lays.</p> <p>Site preparation should be based on the fuels, expected fire behavior and the information you gather conducting structural triage.</p> <p>Use engine crews, hand crews, heavy equipment and other resources available.</p>	<p>5A-13-S215-EP SW p. 5A.7</p>
<p>A. The Structure</p> <p>Look at the structure as fuel. Wood roofs and siding are more vulnerable to ignition than non-combustible types. Virtually any opening into the structure is an entry point for firebrands. Pay particular attention to the likely ignition points.</p> <ol style="list-style-type: none"> 1. Shake roofs 2. Cedar lap siding 3. Open vents 4. Open, broken, and screenless windows 	<p>5A-14-S215-EP</p>

OUTLINE	AIDS & CUES
<ul style="list-style-type: none"> 5. Open doorways or breezeways 6. Open crawl spaces 7. On and under decks 8. Other flammable materials 	
<p>B. On Site Resources</p> <p>Look for things that you can use to help prepare the structure and fight the fire. With a little resourcefulness, lots of things around a home can be put to good use. Such things include:</p> <ul style="list-style-type: none"> 1. Materials for covering openings (plywood, boards, sheet metal, etc.) 2. Hammers, saws, nails, wire, etc., for securing coverings 3. Ladders (put on safe side of house) 4. Rakes, brooms, blowers, etc., for removing leaves, needles, or grass 5. Chain saws, trimming saws, axes, shovels 	<p>5A-15-S215-EP SW p. 5A.8</p>
<p>C. Locate Water Sources</p> <p>Locate water sources that could be used; even small ones.</p> <ul style="list-style-type: none"> 1. Hydrant types: wet barrel, dry barrel, private industrial or agricultural hydrants which require activation before use. 	<p>5A-16-S215-EP SW p. 5A.8</p> <p>5A-17-S215-EP 5A-18-S215-EP</p>

OUTLINE	AIDS & CUES
<ul style="list-style-type: none"> 2. Pools 3. Cisterns and tanks 3. Irrigation systems 4. Garden hose outlets (good for filling engine tank) 	5A-19-S215-EP
<ul style="list-style-type: none"> D. Adjacent Resources <ul style="list-style-type: none"> 1. Contact fire units adjacent to your area of protection. 2. Determine mutual protection boundaries. Adjust assignments if necessary to even the workload. 3. Write down radio call ID's and frequencies. 4. Learn the routes to use in moving to assist each other. 	5A-20-S215-EP
<ul style="list-style-type: none"> E. Clearance Around Structures <p>AN OPTION IS TO SHOW THE “WILDFIRE PREVENTING HOME IGNITIONS” VIDEO TAPE. THIS VIDEO IS A PRODUCT OF JACK COHEN’S RESEARCH AND INTRODUCTION OF THE HOME IGNITION ZONE.</p>	5A-21-S215-EP SW p. 5A.9

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<p>1. Research indicates:</p> <ul style="list-style-type: none"> a. Large flames and crown fires generally don't ignite homes. b. Intense fires burning farther than 100 feet from a structure don't transfer enough radiant heat to ignite the structure. c. More often small ignitions and spotting start structures on fire. <ul style="list-style-type: none"> (1) Firebrands landing on combustible material of or near the home start ignitions. (2) Continuous surface fuels allow surface fires to spread to and ignite the structure. <p>2. Home ignition zone</p> <p>The home ignition zone determines the vulnerability of a home and surrounding area to wildfire.</p> <p>The home ignition zone includes the home and extends a distance of 100 - 200 feet around the outside perimeter of the home.</p>	<p>5A-22-S215-EP 5A-23-S215-EP</p>

OUTLINE	AIDS & CUES
<p data-bbox="284 285 841 321">F. Removing and Trimming Fuels</p> <p data-bbox="386 375 1105 543">State laws vary on who may or may not have the authority to remove fuels around private structures. Get permission from the landowner or appropriate local authority.</p> <p data-bbox="386 598 1057 722">Suppression resources have to communicate, coordinate, and cooperate with the local jurisdictional entities in the interface.</p> <ol data-bbox="386 777 1105 1877" style="list-style-type: none"> <li data-bbox="386 777 1105 1304">1. Combustible material and vegetation should be cleared completely around the structure. As a general rule, the clearance should be at least three times the expected flame length in the primary fuels. Use discretion and consider the homeowner's efforts and expense in landscaping. Landscape trees and shrubbery adjacent to the structure can often be adequately wet down with foam to protect the home. <li data-bbox="386 1358 1089 1566">2. Leave isolated or widely scattered plants, and most ornamental shrubs and trees. Trimming lower branches and eliminating other ladder fuels will effectively isolate the aerial fuel from the fire. <li data-bbox="386 1621 1089 1877">3. Pile cleared vegetation where it will not burn, or will not cause a problem if it does. Simply felling trees or lopping off branches and leaving them lay may create a more hazardous fuel bed than you had before. 	<p data-bbox="1154 285 1393 365">5A-24-S215-EP SW p. 5A.10</p>

OUTLINE	AIDS & CUES
<p>SLIDES 25 THROUGH 32 ARE EXAMPLES FOR THE INSTRUCTOR TO LEAD THE STUDENTS THROUGH A DISCUSSION OF THE HOME IGNITION ZONE (DEFENSIBLE SPACE) AND SITE PREPARATION AND CLEARANCE.</p>	<p>5A-25-S215-EP through 5A-32-S215-EP</p>
<p>G. Fireline Construction</p> <p>Fireline is a strip of mineral soil cleared of vegetation intended to stop the spread of the fire.</p> <ol style="list-style-type: none"> 1. Construct fireline in fuels and terrain where you can control the main fire or your firing operation. Light fuels, grass, scattered shrubs and forest litter are the best location for fireline construction because of minimizing the amount of work required and decreasing the exposure of firefighters holding the line. Try to use openings in tight forest canopies. 2. Fireline should be located as close as possible to the structure. If flammable vegetation that could carry fire to the structure remains inside the control line, firebrands could still ignite a fire that reaches the structure. 3. Take advantage of existing breaks in the fuel. <ol style="list-style-type: none"> a. Roads and driveways. b. Lawns and landscaped areas. 	<p>5A-33-S215-EP SW p. 5A.10</p>

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<ul style="list-style-type: none"> c. Grazed and trampled grass. d. Power line rights-of-way. e. Trails or paths. <p>H. Intermediate Fuels</p> <p>Intermediate fuels are any combustibles located near the structure. They can sometimes convey fire directly to the structure, produce firebrands, or radiant heat that will threaten the structure.</p> <p>Common examples of intermediate fuels:</p> <ul style="list-style-type: none"> 1. Woodpiles (lumber, posts or firewood) 2. Wood fences 3. Decks and awnings 4. Yard furniture 5. Wood swing sets and play houses 	<p>5A-34-S215-EP SW p. 5A.11</p>
<p>I. Yard Accumulation</p> <p>As well as the obvious combustibles that can directly threaten the structure, there are common things scattered round the yard that create control problems or have a value worth protecting.</p> <p>Yard accumulation can interfere with the placement and movement of hose lines. It can also greatly complicate and delay firing operations.</p>	<p>5A-35-S215-EP</p>

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<ol style="list-style-type: none"> 1. Immobile vehicles 2. Boats and small trailers 3. Power tools 4. Stored material (pipes, poles, etc.) 	
<p>J. Flammable and Explosive Hazards</p> <p>Many things can burn violently or explode. They deserve special attention as soon as possible.</p> <p>Examples include:</p> <ol style="list-style-type: none"> 1. Elevated gasoline or diesel tanks <p style="padding-left: 40px;">Clear fuel around such hazards to a distance adequate to protect them from excessive radiant heat. The required clearance will depend upon fire intensity and your ability to cool or shield them.</p> <ol style="list-style-type: none"> 2. LP gas tanks 3. Vehicle components (batteries, shocks, tanks, mounted tires, drivelines, etc.) 4. Pressure vessels and aerosol cans (even if the contents are not flammable) 5. Outbuilding storing fertilizers, pool chemicals, motor vehicle fluids (diesel fuel, brake fluid, oil, etc.) 	<p>5A-36-S215-EP SW p. 5A.12</p>
<ol style="list-style-type: none"> 6. Other hazardous materials 	<p>5A-37-S215-EP</p>

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<p>SLIDES 38 THROUGH 40 ARE EXAMPLES FOR THE INSTRUCTOR TO DISCUSS HAZARDS WITH THE STUDENTS.</p>	<p>5A-38-S215-EP 5A-39-S215-EP 5A-40-S215-EP</p>
<p>V. STRUCTURE PREPARATIONS</p>	<p>5A-41-S215-EP SW p. 5A.13</p>
<p>A. Exterior Preparation</p>	
<p>1. The roof is the most readily and frequently ignited part of a structure exposed to wildland fire.</p>	
<p>2. Clear needles and leaves off of the roof and out of the rain gutters if it can be done safely.</p>	
<p>3. Ladders can be used to access roof areas that can not be wet down with hose from the ground level.</p>	<p>5A-42-S215-EP</p>
<ul style="list-style-type: none"> • Avoid contacting electrical lines with water or when moving a ladder. • Wet roofs and high winds create the potential for falling off the roof. • Avoid climbing on roofs if possible. 	
<p>4. Cover openings and potential openings.</p>	<p>5A-43-S215-EP</p>
<ul style="list-style-type: none"> • Any entry of fire or firebrands into the structure greatly increases control problems and the likelihood the structure will be damaged or destroyed. 	

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<ul style="list-style-type: none"> • Concentrate your efforts to openings on the side of the structure that is exposed to the fire. • Leave window screens attached and close any exterior window coverings. 	
<p>B. Interior Preparation</p>	<p>5A-44-S215-EP SW p. 5A.14</p>
<p>1. Close windows.</p>	
<p>2. Close non-flammable window coverings such as blinds, shades and drapes.</p>	
<p>3. Close interior doors to limit fire spread should the interior become involved.</p>	
<p>4. Turn off fans and swamp coolers that may allow embers into the structure.</p>	
<p>5. Turn off gas (LPG or natural) at the source.</p>	
<p>6. Leave electricity <u>on</u> to run pumps, provide lighting, etc.</p>	
<p>7. Leave on a porch light and a central interior light to provide visibility in dark, smoky conditions. Patrolling engines will more easily notice the house and firefighters entering it will have some light.</p>	<p>5A-45-S215-EP</p>
<p>8. Make sure essential doors can be opened. Close but don't lock all doors.</p>	

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<p>9. Leave a note for the homeowner describing in what condition you have left the structure. (utilities, pets, etc.).</p>	
<p>DISCUSS AUTHORITY AND POLICY FOR FIREFIGHTERS TO ENTER HOMES. REFER STUDENTS TO STATE OF CALIFORNIA OES LETTER.</p>	<p>5A-02-S215-IR 5A-02-S215-SR</p>
<p>C. Private Vehicles</p> <p>Vehicles that will remain on-site can be taken care of to minimize damage to them and to the degree to which they will be in the way.</p> <ol style="list-style-type: none"> 1. Park them in a sheltered location, away from heat and firebrands. 2. Make sure they will not interfere with the movement of fire equipment. 3. Do not park them over flammable vegetation. If flammables are in the area spray a foam blanket around and underneath the vehicles. 4. Park the vehicle headed out, if possible, with the keys in the ignition. 5. Close the doors and windows, but do not lock. 	<p>5A-46-S215-EP SW p. 5A.14</p>

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<p>D. Pets and Livestock</p> <p>Most often, animals that are free to move around will manage to avoid being burned. However, if they are fenced or chained they may need to be freed. Troublesome or frightened pets might need to be placed in the garage, residence, or other enclosure. If a large problem with pets or livestock is encountered, call for assistance from the local animal control agency.</p>	5A-47-S215-EP
<p>VI. PRE-TREATMENT OF STRUCTURES</p> <p>INSTRUCTORS MAY EXPAND ON THIS SECTION AND PROVIDE ADDITIONAL MATERIALS IF DESIRED.</p>	5A-48-S215-EP SW p. 5A.15
<p>A. Sprinkler Systems</p> <p>Sprinklers may be used to wet down the structure and/or the vegetation around a structure.</p>	5A-49-S215-EP 5A-50-S215-EP 5A-51-S215-EP
<p>B. Class A Foam</p>	5A-52-S215-EP
<p>CLASS A FOAM IS COVERED IN MORE DETAIL IN UNIT 5B.</p> <ol style="list-style-type: none"> 1. Proven technique in protecting structures. 2. Can be quickly applied to the structure using engines or portable tanks. 3. Easy to use by batch mixing in tank without foam proportioners. 	

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<p>4. Minimizes removal of ornamental landscaping and fireline construction. Can be used to wet down landscape vegetation around structure.</p> <p>5. Maximizes firefighter safety. Crews move to safety zones until fire front passes, then return to conduct any needed mop-up.</p>	
<p>C. Fire Gel</p> <p>Fire Gel is produced by commercial vendors under various trade names.</p> <p>Fire Gel is a gel concentrate that when added to water, transforms water into a fire preventing and heat absorbing gel. It will adhere to any kind of surface, even vertical window panes.</p>	<p>5A-53-S215-EP</p>
<p>Fire Gel is applied by special nozzles and systems.</p>	<p>5A-54-S215-EP</p>
<p>D. Structure Wrap</p> <p>Structure wrap is available from commercial vendors under various trade names. It comes in rolls (approximately 3 feet wide by 300 feet long) and is made from similar material as the fire shelter. It can be reused if care is taken when removing it from the original application.</p>	<p>5A-55-S215-EP SW p. 5A.16</p>

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<p data-bbox="289 285 1096 499">New materials and chemicals are currently being developed that have proven effectiveness in protecting structures from fires while minimizing the exposure of firefighters. Stay current with rapidly developing technology.</p> <p data-bbox="190 552 711 583">REVIEW UNIT OBJECTIVES.</p>	<p data-bbox="1154 552 1393 583">5A-56-S215-EP</p>



If your home is threatened by a wildfire, you may be contacted by a fire or law enforcement official and advised to evacuate. However, if you are not contacted in time, or if you decide to stay with your home, we offer the following suggestions:

- If you are able, evacuate your pets and all family members who are not essential to protecting the home, but do not jeopardize your life.
- Be properly dressed to survive the fire. Cotton and wool fabrics are preferable to synthetics. Wear long pants and boots, and carry with you for protection a long sleeved shirt or jacket, gloves, a dry handkerchief to shield your face, and goggles. Wear a hard hat.

OUTSIDE YOUR HOUSE

- Remove combustible items from around the house. This includes lawn and poolside furniture, umbrellas, and tarp coverings. If they catch fire, the added heat could ignite your home.
- If possible, close outside attic, eave, and basement vents. This will eliminate the possibility of sparks blowing into hidden areas within the house. Close window shutters.
- Locate garden hoses so they will reach any place on the house. Use the spray-gun type nozzle, adjusted to spray. Turn the hose faucet on so that it is ready to go when it is needed.
- Place large plastic trash cans or buckets around the perimeter of the house and fill them with water. Soak burlap sacks, small rugs, and large rags. They can be helpful in beating out burning embers or small fires.

- Place a ladder against the roof of the house opposite the side of the approaching fire. If you have a combustible roof, set a lawn sprinkler on it. This will be more effective than a hose. However, do not turn water on ahead of time, as wood shingles will dry quickly and you will have wasted water.
- If you have a portable gasoline-powered pump to take water from a swimming pool or tank, make sure it is operating and is in place.

INSIDE YOUR HOUSE

- Close all windows and doors to prevent sparks from blowing inside, but do not lock them. If firefighters arrive to help save your home, they may need instant access.
- Close all doors inside the house to block the circulation of air and movement of fire from room to room.
- Open the damper on your fireplace to help stabilize outside/inside pressure, but close the fireplace screen so sparks will not ignite the room.
- Turn on a light in each room of the house, on the porch, in the garden and in the yard. This will make the house more visible in heavy smoke at night.
- Fill bathtubs, sinks and other water containers with water. Toilet tanks and water heaters are important water reservoirs.
- Shut off gas at the meter.
- If you have time, take down flammable drapes and curtains. If you don't have time to take them down, leave them open. Close all Venetian blinds or fire resistant window coverings to reduce the amount of heat radiating into your home.
- Move overstuffed furniture away from windows and sliding glass doors and into the center of the room.

- Park your car in the garage, heading out; close car windows; leave keys in the ignition.
- Close garage door but leave it unlocked. Disconnect the automatic garage door opener.
- Place valuable documents and mementos inside the car in the garage for quick departure, if necessary. Any pets still with you should also be put in the car.

WHEN THE FIRE IS AT YOUR HOUSE

- Enter your home with your family, closing but not locking the doors. Keep the entire family together and remain calm. Stay inside the house as the fire passes. It takes time for a fire to burn from the outside into the interior of the house. Leave the house if it becomes apparent that the fire is burning inside the house. Consider using the house to block you from outside radiant heat.

AFTER THE FIRE PASSES

- Check the roof immediately. Extinguish any sparks or embers using a garden hose, barrels of water and small rugs. Then, check inside the attic for hidden sparks. Still keep the windows and doors closed in the house. Continue checking for at least six to ten hours after the fire is thought to be out.