

# **STRUCTURES IN THE WILDLAND**

## **(Revised February 2003)**

### **I. INTRODUCTION**

The Wildland Urban Interface (WUI) is defined as the line, area or zone where structures and other human developments meet or intermingle with undeveloped wildland or vegetative fuels (SAF, July 1990). It is synonymous with the term "Intermix".

Structural development has greatly expanded into the wildland area and is continuing to increase at an alarming rate, causing a major increase in the structural wildland interface/intermix firefighting problem.

The WUI presents a significant fiscal liability to the Federal Treasury, State and Local Government, and insurance carriers. There are often large unreimbursed costs to property owners as well. Fires such as the Oakland Hills in California, the Tye in Washington, the Chicken and Blackwell/Corral Complexes in Idaho, sieges in Southern California, Cerro Grande in New Mexico, Rodeo in Arizona, the sieges in Florida, and certainly the Long Island Incident in New York are clear examples of the complexity of protecting the WUI.

The WUI has become a major fire problem that will escalate as the nation moves into the 21st century. The challenge facing fire managers is developing ways for communities and homeowners to help us save their structures. One source of information that can be used in prevention, pre-planning, and education is the FIREWISE Web Page at [www.firewise.org](http://www.firewise.org).

### **II. DEFINITIONS/GLOSSARY**

Definitions: (Appendix F of the IAFC Wildland Urban Interface).

The following are a few of the key definitions that are used when discussing structures in the wildland. The entire glossary is included in the back of this lesson.

#### Interface

A geographical area where structures and other human development meets with wildland fuels or vegetative fuels.

#### Intermix

A wildland/urban interface setting with a few structures spread out through the wildland, rather than a subdivision layout which has a clear delineation between structures and the wildland.

#### I-Zone

A term used to cover both interface and intermix.

### Defensible Space

The area within the perimeter of a parcel, development, neighborhood, and community where basic wildland fire protection practices and measures are implemented, providing the key point of defense from an approaching wildfire, or defense against encroaching wildfire or escaping structure fire.

### Structure Protection

The protection of homes and other structures from wildland fire. (Exposure protection)

### Structure Suppression

All the work of extinguishing or confining a fire involving a structure.

### Structure Triage

The sorting and prioritizing of structures requiring protection from wildfire. (Those needing little or no attention for now, those needing protecting but savable, and those which are hopeless).

### III. FEDERAL FIRE POLICY IMPACTS

The Federal Wildland Fire Management Policy and Program Review, along with the Western Governor's Association, developed specific recommendations to deal with WUI. The two key ingredients are **LEADERSHIP AND COOPERATION**.

Do not confuse your moral responsibility with your legal responsibility. Sometimes, teams will be given the overall command authority for structural protection. Quite often, the local fire department will have the authority under your command. In any case, your team will be involved, and you must develop a structural protection plan before the fire hits.

The Federal Fire Policy asks local, state, and other governing bodies to step up and accept their responsibility for structure protection. No local fire agency has the resources to protect all the structures within the I-Zone from the threat of a major wildfire. Most fire departments are established to handle a single structure fire within a neighborhood. Some larger departments can respond to two or more structure fires without mutual aid. Smaller departments may need mutual or automatic aid for the first fire.

It may be difficult for fire service managers to understand why the Federal Wildland Fire Agencies are no longer providing all the structure protection resources. The other change is that the Federal Agencies are no longer paying a fire department for a service for which they were established. The thought may be, "we wouldn't have a problem if you didn't have a fire on your land that is spreading to my structures." This thought process can go both ways, wildland to structures or structures to wildland.

The issue in protecting structures should be partnership. The best way to protect structures is to put the fire out before it gets to the structures. This is not always possible, or may not meet the direction of structure protection. Many questions may need to be answered prior to the plans being put into effect. These may include:

- Where will the resources come from?
- How long until the resources arrive?
- Who will pay for the resources?
- What are the alternatives?

Some of these questions may have been answered prior to the arrival of the Incident Management Team.

The Federal Fire Policy should be not feared by structural fire departments. It asks that all agencies involved bring a dish to the fire "pot-luck". Many of the perceived issues can be resolved by open and frank discussions prior to smoke being in the air.

### IV. FUNCTIONAL JOB AIDS

The following are some items to be considered when responding to an incident, which is, or will involve structures.

## **Incident Commander**

- § Delegation of authority - What are the priorities? What is the team's role? Is it clearly defined?
- § Unified command - Who is the representative(s) and do they have the authority to commit resources (including expenditures of funds)?
- § Local officials, law enforcement, and citizens groups - Who are the key contacts and how do you reach them? What kind of information do they need?
- § Displaced people or those not wanting to leave - Who has the responsibility to handle?
- § Agreements - Local response, mutual/automatic aid, cost share, or others which may affect the incident.
- § Liaison work - assign a Liaison officer who knows the local area.

## **Plans**

- § Working with a number of other agency's resources under unified command - get information from agencies regarding types and numbers, if not done.
- § Sharing of information - Complete 209's, and sitstat information.
- § Need for good maps - Obtain from local office, local fire departments, or planning departments of city/counties.
- § Need for the technical specialist - structure protection plans - who is going to write one?
- § Good documentation for cost share or legal actions.

## **Finance**

- § Cost share/cost apportionment agreements - What is in place? What agencies are involved? Does a new agreement need to be written? Are cost apportionment technical specialists on the incident or needed?
- § Claims - What has been the need prior to arrival, and what are the projected needs? Damage assessment - who needs to be involved from the local government? Insurance companies will want to come to the incident and perform their own assessments, how to handle?

- § OWCP issues for local emergency workers - Do they all have their own forms? Is the process for treatment and payment known to the agencies?
- § Comptroller/buying unit team interaction - Special needs for structure protection, and how to handle needs of local fire agencies.
- § Use agreements and hiring of local paid/volunteer fire resources - What are the local agreements set up prior to the incident? What is their responsibility for structure protection?
- § Time keeping for local/state resources - Who is going to do it?
- § Cost unit - Where do the cost figures for local resources come from? Do they have, or will the incident have to help them put together?

### **Operations**

- Develop Structure protection plans, involve other Command and General staff, and ensure the Incident Commander approves. Remember unified command when developing plans.
- Organize Structural Branch, Structural Groups, or both. Staff with the best personnel available.
- Be pro-active with evacuations. Ensure the I/C(s) is informed long before it may happen. Keep in mind when to recommend to the I/C to evacuate and when to allow people back.
- Develop contingency plans, stay ahead at least 3 operational periods. Do not get “locked-in” with existing Incident Action Plan and/or Structure Protection Plan.
- Give Logistics plenty of lead-time to provide necessary support for structure protection.
- Do not allow independent actions.
- Focus on structure protection first. Structural fire fighting is still an option, but the strategy is not to start there.

### **Information**

- This incident will draw a lot of media attention. Develop a good media strategy and plan.
- Identify the community groups that need to be kept informed, both formal and informal. Set up information centers with a time schedule for updates. Work with I/C for meeting times and dates.

- Put together an information ‘team’. Use the talents of each team member. Some local fire departments have people on staff as PIO’s that came from the news media.
- Give credit to all of the cooperators when possible.
- The media is going to want human interest stories if structures are lost. They will want to be in the areas where the structures were lost. They will also want to be in the middle of the firefight.

### **Logistics**

- Be prepared for many “high priority” orders from all functions.
- Ensure engine inspection stations are adequately staffed with Ground Support and Equipment Time Recorders.
- Prepare for large demobilization of structure protection resources after the threat has passed.
- Ensure Security personnel are closely coordinating with local law enforcement agencies.
- Coordinate with Operations and Plans to ensure contingency plans for Logistics are covered.

Structure protection will result in detailed communication and medical plans. Pay particular attention to quality and accuracy.

### **Safety Officer**

- Ensure all structure protection safety issues are addressed, and mitigation is provided. Operational briefings should address any concerns.
- Staff Safety Officer positions with personnel having structure protection experience, consider local fire departments and state jurisdictions for this expertise.
- Be prepared for accident investigations. Consider a Multiple Hazards Plan for the IMT to deal with an “incident within an incident.”
- Ensure Medical and Communication Plans are accurate and complete. Stay involved, thoroughly review. Coordinate any changes with Command and General Staff.

## **V. THE STRUCTURE PROTECTION PLAN**

- A. A sample structure protection plan
  - 1. Divide your structural protection plan into tactical areas.
  - 2. Make up a tactical map.
  - 3. Define your strategy and tactics.
  - 4. Identify safety zones and escape routes.
- B. Safety officers must provide input, and offer LCES mitigation to the Structural Protection Plan.

## **VI. STRUCTURAL DEVELOPMENT IN WILDLAND AREAS**

- A. A look at the typical structural/wildland (interface) physical characteristics that cause problems for the firefighter.
  - 1. Type of construction.
    - a. Shake or wood shingles.
    - b. Siding.
    - c. Decks or overhangs.
    - d. Wood and debris piles.
  - 2. Wildland and structural fuel.
    - a. Proximity of wildland fuel.
    - b. Proximity of other structures.
  - 3. Topography.
    - a. Valleys.
    - b. Ridges - saddles.
    - c. Box canyons.
  - 4. Ingress - egress - support.
    - a. Narrow roads.
    - b. Bridge carrying capacity.
    - c. Enforcement - clearances.
    - d. Water supply.
    - e. Limited use of normal suppression resources.

## **VIII. MAJOR CONSIDERATIONS IN ADVANCE OF THE FIRE**

- A. Evacuation: Before the fire hits, an evacuation plan must be established with, and by, the local law enforcement agency. Remember, it is the responsibility of law enforcement and not the team to conduct an evacuation.

An Incident Management Team must:

1. Have direct and constant contact with the Law Enforcement Agency (agency representative).
2. Notify the Law Enforcement Agency when the fire will hit the populated area, and when they should start the evacuation. Lead time is most important.
3. Ensure evacuation routes are safe, and will not take people through the fire area. Ensure evacuation routes are not going to be needed for fire equipment.
4. Talk to homeowners, and distribute self-protection information (contained in class handout).
5. Establish road closures, but don't forget to re-open them when no longer required.

B. Other Agencies

1. Due to the close proximity of populated areas, you can expect many agencies to have direct and indirect involvement with the fire emergency. Some are:
  - a. Local Fire Departments.
  - b. Highway Patrol
  - c. Local Police.
  - d. Sheriff's Office.
  - e. Street-Highway Department.
  - f. Public Works.
  - g. Military.
  - h. Water Department.
  - i. Red Cross.
  - j. Salvation Army.
  - k. Gas Company.
  - l. Electric Company.
  - m. Phone Company.
  - n. News Media.
  - o. Homeowners Association.
  - p. Conservation Groups.
  - q. Politicians.
2. Staff your organization with a liaison, safety, and information officer quickly. The more information you put out, the less questions and outside influence problems you will have. These three positions will take a tremendous amount of pressure off the management team.

Quite often, it may take considerable time to obtain the necessary engines. Logistics must react to find ways and procedures to obtain engines, establish required lead times for equipment arrival, and

communicate this information to other team members.

**IX. OPERATIONAL CONSIDERATIONS IN STRUCTURE PROTECTION**

A. Choosing the engine for the job.

1. Equipment complement.

a. Hose complement.

b. Tools - wildland vs. structural.

2. Water tank capacity.
  - a. Ability to sustain an attack without a static source.
 

Type 1	400 gal.
Type 2	400 gal.
Type 3	300 gal.
Type 6	200 gal.
Tenders	1,000 gal.+
3. Open or closed cab.
  - a. An open cab is very dangerous on wildland fires. Numerous firefighters are burned out in the open, on the back of an engine, or attempting to outrun the fire.
  - b. Hose bed - is it covered, and with what? Diamond plate is best.
4. Conventional or 4-wheel drive - off road capacity.
  - a. Depending on terrain, a 4-wheel drive may be required if traction, climbing ability, or ground clearance are important.
  - b. Remember , 4-wheel drive may require longer travel time on the highway, and may not be as readily available.
5. Wheelbase.
  - a. Ability to negotiate narrow roads with short radius or steep climbing turns.
  - b. Turning radius short enough to change directions rapidly when needed.
6. Weight.
  - a. Roadbed.
  - b. Bridge capacity.
  - c. Septic tanks.
7. Mechanical condition.
  - a. Often, strike teams may end up with relief engines that are not first line equipment.
  - b. Structural type engines may not be equipped with adequate air cleaner protection.
    - (1) Flying embers in paper elements - motor quits.
  - c. Tire not adequate for off road use.

8. Pump type.
    - a. Main pump - midship.
      - (1) Disadvantage - not mobile.
    - b. PTO.
      - (1) May be capable of pumping and rolling slowly.
    - c. Auxiliary pump with separate power source.
      - (1) Best if hit and run is what you need.
      - (2) Water curtain can be provided for safety, even when engine is moving.
  9. Personnel on engine.
    - a. You cannot expect a three-person crew to put a progressive hoselay in as fast as a four or five-person crew. Order what you need.
    - b. Experience of the company officer members determines the capabilities of an individual engine.
    - c. Fatigue becomes a critical factor.
  10. Remember that when things are tough and homes are burning, what you may need is just the closest engines of any type right away.
- B. Type of assignment for an engine or Strike Team will help you determine the best suited engine for the job.
1. Mobile attack on grass fires.
    - a. Ability to hit and run.
    - b. Shorter wheelbase generally better.
      - (1) Better approach angles.
      - (2) Better ground clearances.
  2. Stationary pumping on a hoselay.
    - a. Length of hoselay may indicate the need for a larger water tank if supply is being transported to scene.
    - b. Hoselay elevation may require a pump that will pump 450# pressure.
  3. Primarily off-road pumping.

- a. Generally, best to use brush engines.
  - b. Avoid damage to larger more expensive engines.
4. Structure protection.
- a. Depending on terrain and area you're working, smaller, and shorter wheelbase engines with foam capabilities are better than T1 and T2's due to narrow winding roads and short, steep driveways. Additionally, pump and roll capabilities make these resources more effective.
5. Deployment of equipment.
- a. When assigned to a fire, engine deployment is critical. Get a clear assignment from your supervisor.
    - (1) Always have an escape route.
      - (a) Back engines in.
      - (b) Use buildings or natural barriers for protection.
      - (c) Don't park at top of draws or natural funnels.
    - (2) Don't park under power lines. Keep engines working as a team. Exercise tight control.
      - (a) Don't spread out too far. Visual contact is best.
    - (3) Strike team leader should survey area to check for special conditions or hazards.
    - (4) Unless absolutely necessary, don't have engines lay long hoselays. They will cut mobility and may burn up a lot of hose.
  - b. Before deploying, assure that all personnel are in full protective equipment, all water tanks are full, all engines have adequate fuel, and all radios work.
6. Use of water - plan and discuss its use ahead of time.
- a. Water conservation - with hydrant supply.
    - (1) Consider effect of heavy water consumption on main water lines.
    - (2) What about adjacent water mains? Other companies working out of your vision? Residents or firefighters working off garden hose?
    - (3) When water conservation is important, don't wet down ahead of fire, extinguish only what is absolutely necessary.
      - a. Don't waste water on wood shingle roofs - they dry too fast.
      - b. When possible coat structures with foam.
    - (4) Remove combustibles, which require more water use.

- (a) Move garden furniture.
- (b) Cut away fuel from around structures.
- (c) Cut and remove brush along hillside road where stand is to be made while waiting for fire.

- (5) Let everything burn that is not vital to fire control or not an exposure hazard to objects of value.
- (6) Don't lay a line just because there is a lot of fire and a hydrant. Have a compelling reason.
- (7) If lines are left at a fast-moving fire, take the fittings with your apparatus if possible.

b. Water conservation, with tank supply.

- (1) Conserve limited supplies. Use hand tools in conjunction with a hose line when working on brush.
- (2) Always know what your water level is.
- (3) Never go below 100 gallons of water.

c. Water tender use.

Where water supply is a problem strike team leaders, division supervisors, or operations section chiefs should order sufficient water tenders to keep strike teams adequately supplied.

- (1) Depending on travel time and distance, two water tenders can keep most strike teams supplied.
- (2) Water conservation must be enforced, even when working with water tenders.

7. Protecting structures and motor vehicles (ahead of fire).

- a. Close windows, garage doors, and other openings.
- b. Leave lights on, so the house can be seen at night or with dark smoke.
- c. Put combustible garden furniture in garage or house.
- d. Move woodpiles away from structures.
- e. Move combustible fences away from structures.
- f. Ask residents to move lace-type curtains from windows on exposed side. Heavy drapes may be advantageous.
- g. Chop down highly combustible shrubbery, and place where it will not expose a structure.

- h. Remove any combustibles from the vicinity of LP gas tanks.
  - i. Shut off gas.
  - j. Have civilians place stepladders on front porch, or where readily visible.
  - k. Place fire department extension ladders at houses you will later try to save by working on the roof.
  - l. Hook up available garden hose - test for water pressure.
  - m. Remove leaves from roofs and gutters.
  - n. Call truck companies where or if practical.
  - o. Civilian motor vehicles.
    - (1) Put in garage - heading out, not in.
    - (2) Close all windows - no matter where vehicles are.
    - (3) Park where least exposed - but not in driveway where fire apparatus might operate or hose lines might be laid.
      - (a) Not in narrow street, front lawn would be better if practical.
8. Protecting structures (when fire hits).
- a. A structure will seldom burst into flames; it usually starts as a small fire in one or more spots.
    - (1) Blowing sparks trapped under shingle or shake roofs.
    - (2) Heat or flames trapped beneath the eaves of a roof.
    - (3) Burning debris blown through ground vents or attic vents.
    - (4) Windows broken from heat and drafts.
    - (5) Doors or windows left open.
    - (6) Exposures from fire (remove if possible).
      - (1) Shrubbery, trees.
      - (2) Combustible garden furniture.
      - (3) Fences.
      - (4) Woodpiles.
      - (5) Automobiles.

(6) Combustible rubbish.

b. Survey ahead of fire, and give priority of protection considering construction and topographical factors, equipment and personnel to be utilized, and fire spread.

c. Common errors.

(1) Laying hose lines too far away from the structure, using too much hose, and tiring out the firefighters.

(2) Meeting the fire where an easier stand can be made.

(3) Not maintaining sight or radio contact with engines in the strike team.

(4) Wasting time and energy on structures that will be lost no matter what effort you expend.

(5) Employing unnecessary apparatus, where less will do. Clogging roadways.

(6) Parking equipment where it is unnecessarily exposed to direct line.

(7) Laying unnecessary lines.

(8) Wetting down shingle roofs and adjoining areas when insufficient water is available.

(9) Don't use hard lines.

C. Safety.

1. If fire is too hot, retreat into structure, close engine cab, or get into a swimming pool temporarily. When fire passes, extinguish burning exterior.

2. Without a specific purpose, don't face an intense fire. Retreat to protection (behind fence, ledge, house) and go to work at a more favorable moment.

3. Keep apparatus mobile - at a fast moving fire, this is called stand and fight, or cut and run. Run not in fear, but because it is the best decision.

a. Move from structure to structure with the fire.

b. Do not leave a firefighter in a difficult situation.

c. If the civilian owner is present, let them know of possible places of flare-ups before you leave.

- d. Park behind a structure, heading out of driveway.
4. Engine safety.
    - a. Headlights on at all times (spotlight can be turned upward at night for visibility).
    - b. Windows closed.
    - c. Coiled pre-connected charged 100' 1-1/2" or 1-3/4" hose.
    - d. Pump running if auxiliary or skid mount.
  5. Park on roadway adjacent to structures, always choose a heading with direction of fire travel, or head towards a possible escape route.
  6. When protecting structures, and making a stand along a road, detail firefighters to prevent fire from spotting across.
  7. Fire out around structures where possible, but only after advising your supervisor of your intention.
  8. Stay out of saddles and chutes.
- D. What to tell civilians about the dangers?
1. Remind them that even fire department activities can be dangerous to them.
  2. Ideally, evacuation is primarily a police problem - leaving the fire department free to operate.
  3. Encourage civilians, especially elderly or ambulatory individuals to leave the fire area on foot, or in vehicles, if practical.
  4. Explain that in almost all instances, a person is safe in a well-built structure when a fire sweeps past, even though the structure may eventually be destroyed.
  5. If civilians are determined to stay with their homes, explain the value of removing any exposures, (furniture, shrubs, wood piles, etc.). Tell the civilians how to protect themselves, and explain to them how to handle a garden hose.
  6. Try to stress the importance of keeping the family together. This reasoning sometimes assists the evacuation effort.
- E. Structure Protection Triage.
1. Triage
    - a. Eliminate the hopeless.

- b. Ignore the unnecessary.
  - c. Deal with the rest.
2. Company officers, strike team leaders, division supervisors, and operations section chiefs must be capable of making one of the most difficult decisions on a wildland fire; which homes to try to save, and which ones to write off. Some guidelines are:
- a. Look at this structure itself.
  - b. Types of roof coverings, wood over hangs, and proximity to brush. In an intense fire, shake shingle roofs and wood sided houses are very difficult to save.
  - c. Defensible space.
  - d. Consider personnel safety.
  - e. Consider available resources.
  - f. Fire behavior.
  - g. The surrounding fuels.