9. RECOMMENDED FIRE SAFE STANDARDS

State regulations, and to some extent local ordinances, are minimum standards that substantially imply the need for more stringent pre-fire management standards. The nature of the regulatory process creates a series of standards that are predicated upon minimums, yet become maximums when applied as law. This certainly applies to wildland fire prevention standards. The regulations discussed in the last chapter are minimum standards. There is a need in many cases to promote a greater level of protection for less vulnerability. This is certainly an option for any homeowner or developer. The design and construction of structures, subdivisions and developments in the wildlands of California should provide for defensible space and built-in wildland fire prevention. This should be a common goal with interested state agencies, local jurisdictions and fire agencies.

9.1 National Fire Codes

The National Fire Codes are a product of the National Fire Protection Association (NFPA). These model codes are annually compiled from the codes, standards, recommended practices, manuals, guides and model laws that are prepared by the individual technical committees of NFPA. The members of NFPA adopt the published codes. The individual codes are in many cases adopted by jurisdictions, or modified and adopted as that jurisdiction's ordinance. For more information about NFPA, go to **http://www.nfpa.com.**

9.2 Uniform Fire Code

The Uniform Fire Code (UFC) is a product of the International Fire Code Institute (IFCI). This Code is a model code that is designed for adoption by local jurisdictions. Many jurisdictions have amended and modified the UFC as their local fire code. IFCI, recognizing the growing problem in the Western United States, has also developed the ***Urban-Wildland Interface Code***, 1997 Edition, which is available through their office. Contact IFCI at **http://www.ifci.com.**

9.3 Uniform Building Code

California has adopted the Uniform Building Code (UBC), with state-adopted modifications, as the standard for construction known as the California Building Code (CBC). In support of this standard, most counties have adopted the National Electrical Code (NEC) and the Uniform Plumbing Code (UPC) to regulate construction. These codes have been written to work in concert with each other; however, they do not recognize nor address the Urban-Wildland Interface fire problem, since they were not developed with California's specific environment in mind. Location of structures and subdivisions and the allowable exterior building materials may incorporate wildfire vulnerability into new homes and developments. There is a lack of consistency between adjacent jurisdictions and statewide areas as to what is and is not authorized in terms of wildland fire prevention and protection. The California Building Standards Commission can be contacted at **http://www.dgs.ca.gov/bsc**.

Every new building or remodel of an existing structure should be constructed to at least meet the requirements specified in the current edition of the CBC as outlined by the International Conference of Building Officials (ICBO) for the group and type of occupancy intended. More stringent standards may be necessary as determined by the local jurisdiction. Specific sections, including spark arresters and fire department access, should be consulted and reviewed. For more information about ICBO, go to **http://www.icbo.org.**

9.4 Local Regulations and Ordinances

A more restrictive provision shall supersede the requirements of the Uniform Building Code when required by other statutes or regulations adopted pursuant to statutory authority or by any local ordinance.

9.5 Siting, Spacing and Density Considerations

Structure density, spacing and siting should be based on the fire hazard severity classification and the on-site topography. As fuels and slopes increase, low density or planned unit developments should be considered. From a protection standpoint, it is easier to protect these two types of developments.

Buildings must be set back at least 30 feet from the property line on parcels one acre and larger (PRC 4290). Since close spacing is common in mobile home parks, those situated in wildland areas are particularly susceptible to destruction by wildfire. Spacing should conform to those standards already mentioned.

Building densities should be as follows:

- 15-30 percent slope, no more than three dwellings per acre.
- 31-50 percent slope, no more than one dwelling per 3-5 acres.
- Where slopes and fuels exhibit very high fire hazard, local government should prohibit development or apply more stringent standards.
- In all cases, development of ridge tops, canyons or ridgeline saddles should be limited or mitigated with greater levels of built-in fire prevention.

Photograph 9.1.
Structure Siting

9.6 Lot Development

Lots that front on two or more streets should provide access for vehicles from the street to which the address is assigned. All new access roads and driveways must conform to local fire safe standards.

Photograph 9.2.
Lot Development

9.7 Building Construction Standards

9.7a Structure Vulnerability

Professional experience and research have documented the two most vulnerable elements of a structure: the roof and the flammable vegetation around the structure. CDF has several research projects in progress that will add to the wealth of professional knowledge that currently guides wildland fire prevention. While not available at the time this guide was printed, interested individuals should contact the local CDF office for current information. Additional information is also available on the Internet at **http://www.ucfpl.ucop.edu**.

9.7b Roofing

One common issue surfaces among the numerous reports, papers and tasks related to the problem of homes and developments constructed in areas with potential for major wildfire conflagrations: flammable, non-rated wood shakes and shingles have made buildings especially vulnerable to ignition from flaming material carried by the winds and convection columns in advance of a fire front. Once wood shakes and shingles have ignited one building, they are torn away by the wind and rapidly carried by the convection column to ignite additional vegetation and roofs of other buildings. The roof is the most vulnerable part of a building during a wildland conflagration. A roof that is horizontal is especially vulnerable because it can catch and hold firebrands carried by strong winds and convection columns characteristic of these fires. Unlike

ground fire, a conflagration produces firebrands that travel over and beyond any natural or artificial fire break and are a distinct hazard to structures as far as a mile away from the wildfire.

Photograph 9.3.
Shake Shingles Before and After a Fire

9.7c One Preliminary Study

Following the devastating series of fires in June and July of 1985 in Southern California, CDF sponsored a study by the University of California to evaluate the structure loss on two of the fires that occurred during this period. Of the 42 homes with asphalt and fiberglass roofs that were threatened, 37, or 88 percent, were not destroyed. Of the nine houses with shake roofs, six, or 67 percent, were not destroyed. The study also pointed out that a house with a fire retardant roof had a 70 percent better chance of surviving a wildfire, even when flammable vegetation had not been cleared as required by PRC 4291.

9.7d Roofs Contribute to Fire Spread

During wildfires, structural ignition comes from any of three sources: direct exposure to the flames, radiated heat or firebrands carried by winds or convection columns. The roof is the most common structural fuel bed for ignition by these flying firebrands. Therefore, fire retardant roofing materials are of prime importance as a personal protection and fire prevention measure.

Test methods have been developed to evaluate the fire hazards of roof coverings. NFPA 256, ***Methods of Fire Tests of Roof Coverings***, describes the appropriate procedures. The test evaluates the flammability of the roof covering, the protection it provides to a combustible roof deck, and the potential for producing flaming brands. Roof materials are classified as Class A, Class B, and Class C. To receive one of the classifications, the roof covering is given a series of fire tests of varying degree of severity. After all roof-covering tests have been conducted, roof coverings are classified based upon test results:

- Class A covering is one that is effective against a severe fire exposure, affords a high degree of fire prevention to the roof deck, does not slip from position, and does not present a flying brand hazard.
- A Class B roof covering is one that is effective against a moderate fire exposure, affords a moderate degree of fire prevention to the roof deck, does not slip from position, and does not present a flying brand hazard.

- A Class C covering is effective against light test exposure, provides a light degree of fire prevention to the roof deck, does not slip from position, and does not present a flying brand hazard.

Photograph 9.4.
Class A Roof

The specific definition of each roofing classification is dependent upon the roofing material, roofing support construction and sheathing. With a given surface material, the classification may change, depending on whether the sheathing is solid (plywood) or lath, and whether the underlay material is foil, tar paper or felt (different weights available). The Class A rating provides the most fire resistive characteristics.

Roof coverings may not be the only failure contributing to the rapid spread of fires. All structural features (roofs, siding, windows and eaves) need to be evaluated for their ability to provide an acceptable level of safety for the homeowner during a wildland fire.

It is especially important that the roof be kept free of flammable material such as pine needles. Tile roofs should also be plugged in the ends of the tile rows because bird nests were shown to be a significant cause of house loss via fire entry from the roof. Additional information is also available on the Internet at **http://www.ucfpl.ucop.edu.**

9.7e Roof Covering Requirement

New regulations affecting roof coverings have been established pursuant to AB 423 (Chapter 380, Statutes of 1999). Roof covering regulations are located in the 1998 California Building Code, Sections 1503.1-1503.3. See Section 1502 for the definition of fire-retardant shakes and shingles.

9.7f Sprinkler Systems

Automatic and/or manual roof sprinkler systems will not substitute for the required roof covering, as these systems are too unreliable. Roof sprinklers are also not a substitute for on-site or nearby emergency water storage. Residential sprinklers are highly recommended to protect a family and to prevent the spread of an interior structure fire to the wildlands; however, they are not a substitute for nearby or on-site emergency water storage.

9.7g Eaves, Balconies, Unenclosed Roofs and Floors

Eaves, balconies, unenclosed roofs and floors and other similar surfaces should be protected on the exposed underside by materials approved for one-hour fire resistant construction. All supporting members (vertical, horizontal and diagonal) used in stilt or cantilevered construction shall be built to one-hour fire resistant construction as set forth in the 1998 California Building Code, Chapter 7.

9.7h Chimneys and Vents

Every chimney or vent attached to any solid or liquid fuel-burning device shall be provided with an approved, securely attached spark arrester conforming to requirements outlined in the 1998 California Building Code, Section 3102.3.8(a) relating to spark arresters. The spark arrester shall be maintained, in working condition, mounted in a vertical or near vertical position, and visible from the ground (PRC 4291[c] and [f]).

All attic openings, soffit vents, foundation louvers or other ventilation openings in vertical exterior walls, eave overhangs and vents through a roof should not exceed 144 square inches each, and covered with one-quarter-inch mesh metal screens which are corrosion resistant. Pre-cut, fire resistive vent covers should be available for installation when a wildfire is threatening.

Photograph 9.5.
Dormer Vent and Chimneys

9.7i Exterior Walls

Exterior walls of buildings should be protected with materials of not less than one-hour fire resistant construction on the exterior side (see Table 7-B of the CBC). The materials should extend from the top of the foundation to the underside of the roof sheathing.

9.7j Rafters

The spaces between rafters, the wall plate line and the underside of the roof sheathing should be filled with not less than two-inch nominal thickness wood or equivalent solid blocking.

9.7k Windows

The vulnerability of windows to wildfire is currently being debated. Until that debate is settled, it is prudent to take the position that windows are a vulnerability. Windows, especially large vista windows, should be limited in number on the side of a building that faces high hazard fuels. Windows should be dual or triple-paned to resist breaking and radiant heat. These window types are also energy efficient. Fire resistive shutters should be constructed in advance and be available to cover all windows when a wildfire is threatening.

9.7l Dooryard Activities

Firewood piles and LPG tanks (UFC Section 8209) should be located a minimum of 30 feet from any structure. Each should be provided a 10-foot clearance of flammable vegetation and material in all directions. Firewood piles, smoldering after the fire has passed, have contributed to the loss of many homes that otherwise survived the initial fire onslaught.

LPG tanks, when overheated, can explode, sending large pieces of shrapnel and flaming gas in all directions. The LPG pressure relief valve in this case is overwhelmed and is unable to release the required pressure. In many cases, the pressure relief stream is ignited and becomes a blowtorch. The pressure relief valve should be directed away from any structure or access road.

Photograph 9.6.
LPG Tank