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THE WOOD SHAKE AND SHINGLE ROOF HAZARD

Edwin G. Smith, Range Education Specialist
John Christopherson, Natural Resource Specialist
Gerry L. Adams, Fire Marshal, North Lake Tahoe Fire Protection District

There was a time when *wood shakes and shingles* were one of the few roofing materials available to the consumer. Today, there are a number of roofing products from which the homeowner, builder, and architect can choose. Wood shakes and shingles are frequently selected because of their aesthetic appeal, ability to blend a structure into a forest background, good insulation properties, and durability (if properly maintained).

Although the advantages are noteworthy, wood shake and shingle roofs possess a highly undesirable characteristic:
WOOD SHAKE AND SHINGLE ROOFS INCREASE THE RISK OF STRUCTURE LOSS DUE TO WILDFIRE. The risk has been considered so great, that their use has been banned in some communities. This publication discusses the wood shake and shingle roof hazard in the Lake Tahoe Basin.

THE HAZARD

A house can be threatened by wildfire in three ways: direct exposure to flames, radiated heat, and airborne *firebrands*. Of these, firebrands account for the majority of homes burned due to *wildfire*.

Firebrands are burning embers produced by fire which are lifted into the air by a *convection column* and carried beyond the fire front. Typical firebrand materials include pine cones, bark, and if houses are burning, shakes and shingles. Depending on wind speed and size of material, firebrands can be transported and deposited up to .5 mile (or further in extreme cases) ahead of the fire.

A shower of thousands of firebrands can be produced during a major wildfire. If these firebrands land in *receptive fuel beds*, numerous *spot fires* will be produced. Even homes located blocks away from the main fire can be threatened.

The most vulnerable part of a house to firebrands is the roof. Because of its angle, the roof can catch and trap firebrands. If the roof is constructed of combustible materials such as *untreated* wood shakes and shingles, the house is in jeopardy of igniting and burning.

During the summer fire season in the Tahoe Basin, temperatures are high and relative humidity is low. These conditions make untreated wood shake and shingles easily ignitable. In addition, wood shakes and shingles are typically made from western red cedar which possesses the low ignition temperature of 378°F. (Note: a glowing cigarette has an approximate temperature of 550°F). Consequently, the untreated wood shake and shingle roof in the Tahoe Basin is potentially an extremely hazardous, receptive fuel bed.

Not only are wood shake and shingle roofs a hazard to the structure on which they were installed, but also to other houses in the vicinity. Burning wood shakes and shingles can peel off, become firebrands, and be carried to additional receptive fuel beds, such as other combustible roofs and flammable vegetation in the home landscape. Firebrands consisting of burning shakes and shingles have been a major contributing factor to numerous fires in the western United States.

The presence of flammable vegetation growing adjacent to the structure may also constitute a receptive fuel bed in the Tahoe Basin. A firebrand landing in flammable vegetation can start a fire and threaten a nearby house.

Note: Words in italics are described on page 4.

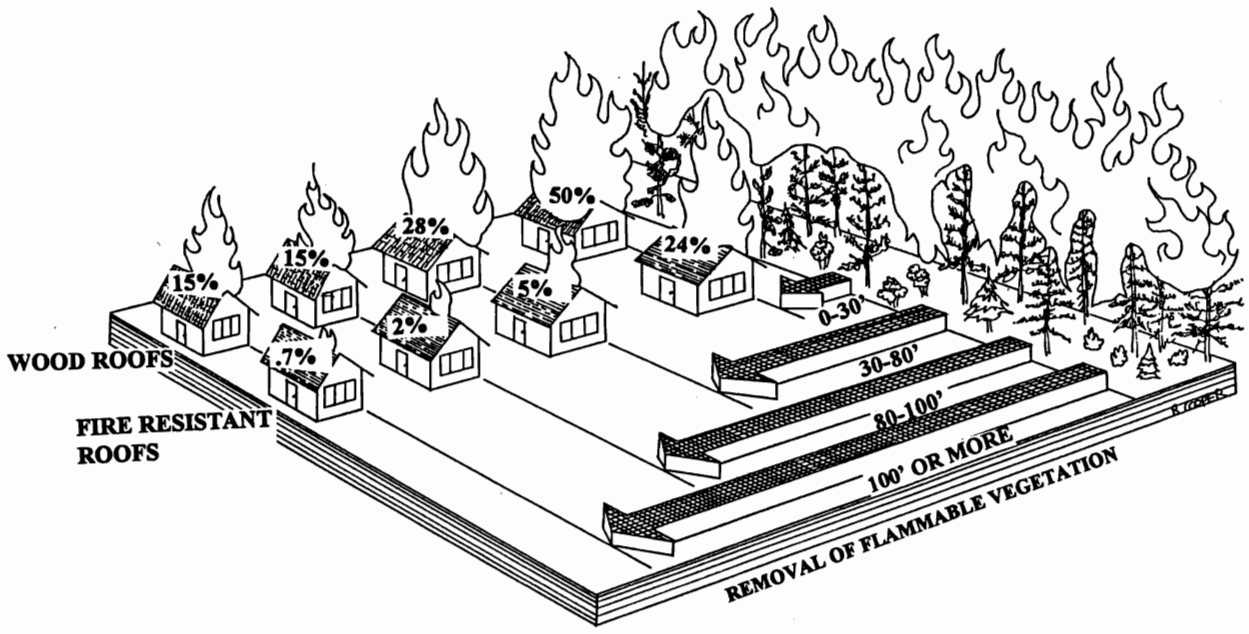

Figure 1. PERCENT OF HOMES DESTROYED BY WILDFIRE

EFFECT ON HOUSE SURVIVABILITY

The probability of a house surviving a wildfire is greatly influenced by the type of roofing material involved and the amount of clearance of flammable vegetation.

Figure 1 portrays the results of an investigation of 1,850 Southern California homes involved in wildfires. Depending upon the amount of brush clearance, **houses with untreated wood roofs were 2 to 21 times more likely to be destroyed by wildfire than those with fire resistant roofs.**

Based on an investigation of 450 homes destroyed by wildfire in Australia, researchers concluded that the presence of wood shake roofs was the single most influential factor in reducing house survivability under a given fire intensity. Fire investigation reports within the United States also support this conclusion.

Wildfire statistics collected from the Santa Monica Mountains of California, suggested that the most cost effective method of increasing house survivability during a wildfire event is the presence of a fire resistant roof and proper clearance of vegetation around the structure.

It is important to note that the installation of a fire resistant roof and removal of adjacent flammable vegetation does not make a house invulnerable to wildfire. During intense wildfire conditions, exterior wall coverings, types of windows, slope position of the structure, and other factors can affect house survivability.

REDUCING THE VULNERABILITY OF THE ROOF

Existing Untreated Wood Shake and Untreated Shingle Roofs: For homeowners with wood shake and shingle roofs, there are no long-term reliable measures available to reduce roof vulnerability to wildfire other than reroofing with fire resistant materials. Two popular approaches aimed at offsetting the wildfire threat to the roof have been surface application of fire retardant chemicals and installation of roof watering systems.

Spray-on or brush-on treatments of fire retardant chemical to wood shake and shingle roofs have limited longevity. Soon after application, these treatments begin to lose their fire resistant characteristics due to leaching and exposure to sunlight.

How Are Roofs Rated?

Roofs are labeled as Class A, B, C and Non-Rated in terms of their resistance to external fire exposure. These ratings are based on a roof covering's ability to withstand varying degrees of fire intensity under laboratory conditions. A description of each rating is presented below.

Class A: Withstands the most severe fire exposure, is not readily flammable, does not contribute to the spread of fire across the roof, affords a high degree of protection to the roof deck, and will not produce flying firebrands.

Class B: Withstands moderate fire exposure, is not readily flammable, does not contribute to the spread of fire across the roof, affords a moderate degree of protection to the roof deck, and will not produce flying firebrands.

Class C: Withstands light fire exposure, is not readily flammable, does not readily contribute to the spread of fire across the roof, affords slight protection to the roof deck, and will not produce flying firebrands.

Non-Rated: Cannot meet the fire resistant requirements associated with the Class C rating, or does not seek a fire resistance rating. Does not qualify as a fire resistant roof covering

Please Note: Fire resistant ratings of roof coverings are also influenced by the type of roof deck, underlayment, and installation method. Consequently, a Class C rated roof covering can be upgraded to a Class B rating if an appropriate roof deck and underlayment is utilized and properly installed.

To be effective, these treatments must be reapplied on a regular basis. Generally, these treatments have not received certification from the Underwriters Laboratories or the state fire marshals of Nevada and California.

Roof watering systems, in theory, could be effective in reducing the vulnerability of the wood roof to wildfire. Their effectiveness is dependent upon sufficient water pressure and a reliable power source to pump water to the roof. During a wildfire, however, water pressure may be inadequate due to firefighter demands and electrical power may be cut off. In addition, sprinkler type systems may not uniformly wet the roof due to high winds often associated with wildfires. Consequently, roof watering systems may be rendered unworkable when they are needed most.

New and Replacement Roofs: Installing a roof covering that utilizes fire resistant materials and construction techniques is an effective means to reduce the roof's vulnerability to wildfire. Roof coverings rated Class A, B, or C are considered fire resistant, but to varying degrees (see "How Are Roofs Rated?" at left).

Fire resistant roof coverings that are non-combustible include masonry types, metal, and slate. Fiberglass shingles, asphalt shingles, and *pressure treated* wood shakes and shingles, when properly installed over specified *roof decks* with appropriate *underlayments,* are also considered fire resistant*. Fire resistant roofs vary greatly in terms of material, appearance, longevity, and cost. Request from roofing contractor laboratory test results on the longevity of fire resistance of any wooden roofing materials being considered for use.

Which class rating and type of fire resistant roof covering is right for you? It depends upon local codes, degree of wildfire threat, and personal preference. **Consult your local fire marshal and building department for sound advice.**

Maintenance: Regardless of the type of roofing materials utilized, keep the roof, rain gutters, and eaves free of debris. Routinely remove pine needles, leaves, and litter from these areas during the fire season.

Untreated Versus Pressure Treated Wood Shakes and Shingles

Untreated wood shakes and shingles are readily ignited by firebrands, sparks from chimneys, and direct exposure to fire. Furthermore, burning untreated wood shakes and shingles can become firebrands and contribute to the spread of wildfire. They are considered a "Non Rated" roof covering which is reflective of their flammability.

Pressure treated wood shakes and shingles, on the other hand, have a higher degree of fire resistance. These wood shakes and shingles are impregnated with fire retardant chemicals under pressure at the factory. Class B or C fire resistance ratings can be achieved for pressure treated wood shakes and shingles depending upon the amount of chemicals injected and/or the type of roof deck and underlayment used.

*Many local jurisdictions prohibit the use of wood shakes and shingles in new construction.

CONCLUSION

The presence of an untreated wood shake or shingle roof increases the risk that a home will be damaged or destroyed during a wildfire. Furthermore, burning shakes and shingles can contribute to the spread of wildfire through spotting. Using properly installed fire resistant roofing materials, especially when coupled with clearance of flammable vegetation, can greatly improve the odds of a house surviving a wildfire.

DEFINITIONS

Terms appearing in italics within the text are defined below:

Convection Column: A rising column of gases, smoke, and debris produced by a fire.

Firebrands: Any burning materials such as needles, wood, glowing charcoal, or sparks that could start a wildfire.

Pressure Treated: As used in this publication, refers to a process in which fire retardants are impregnated into wood shakes and shingles under pressure and which meet the requirements of the Uniform Building Code Standard 32-7 and the Underwriters Laboratories Test UL-790.

Receptive Fuel Bed: An arrangement of combustible material that is likely to produce a detectable fire when ignited.

Roof Deck: That portion of the roof to which roof coverings (e.g. shingles) are directly attached.

Spot Fire: A fire occurring outside the perimeter of the main fire that is caused by firebrands.

Underlayment: A material (e.g. roofing felt) positioned between the roof covering and roof deck to improve fire resistance and/or weather resistance of the roof.

Untreated: As used in this publication, refers to any wood shake or shingle that has not undergone the pressure treatment process (See Pressure Treated).

Wildfire: Any fire occurring in wildland situations which is usually dependent upon native vegetation for fuel.

Wood Shake: A type of roof covering typically made from split pieces of western red cedar wood resulting in a rough and uneven surface.

Wood Shingle: A type of roof covering typically made from sawn pieces of western red cedar wood.

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