

Building Materials and Design for Home Survival in Wildfire Prone Areas

Presented at

**Northwest California Regional Fire Safe Conference
Fortuna, California**

by

Steve Quarles

**University of California Cooperative Extension
1301 S. 46th St., Bldg. 478
Richmond, CA 94804**





Buildings in wildfire prone areas must be protected from:

✓ Embers (lofted vegetation or construction materials that are burning)

✓ Flame impingement (near-by vegetation or debris, construction material, fire wood or other woody debris)

✓ Radiant Heat (dense vegetation, an adjacent building/deck fire)

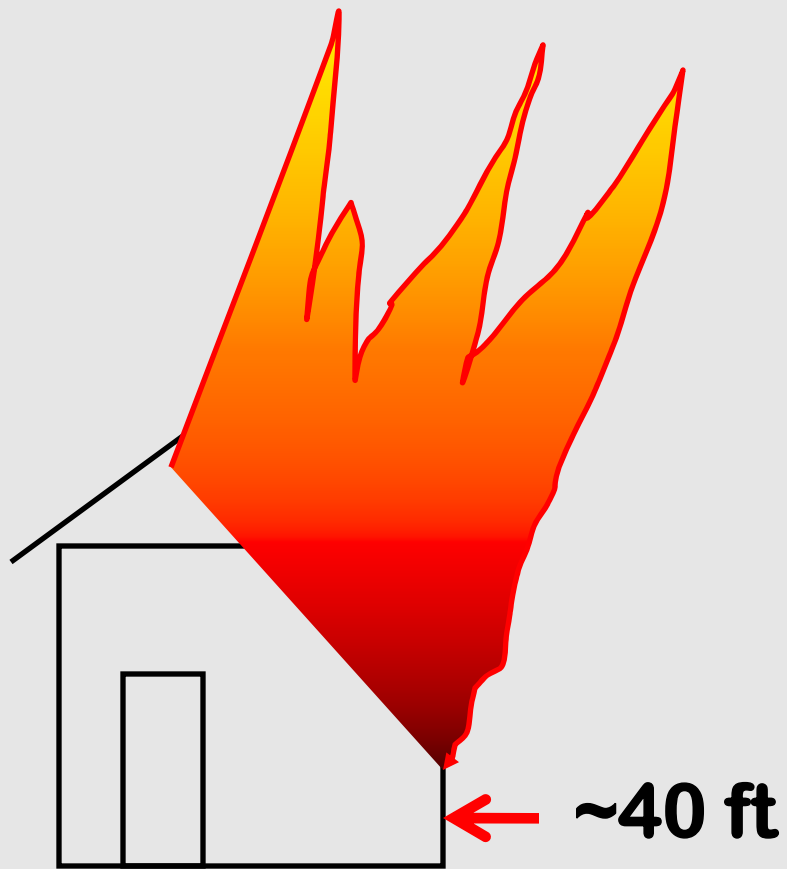




**Angora Fire,
June 2007**



Shredded paper, ignited after ember exposure



**Radiant exposure
from neighbor's house**



Radiant heat flux measured 10-m from a crown fire.

Western redcedar siding ignited after ~ 3 min (20 kW/m²) and ~ 30 sec (30 kW/m²).

Figure courtesy of Jack Cohen, USDA FS; Siding data compiled by V. Babrauskas (*Ignition Handbook*).

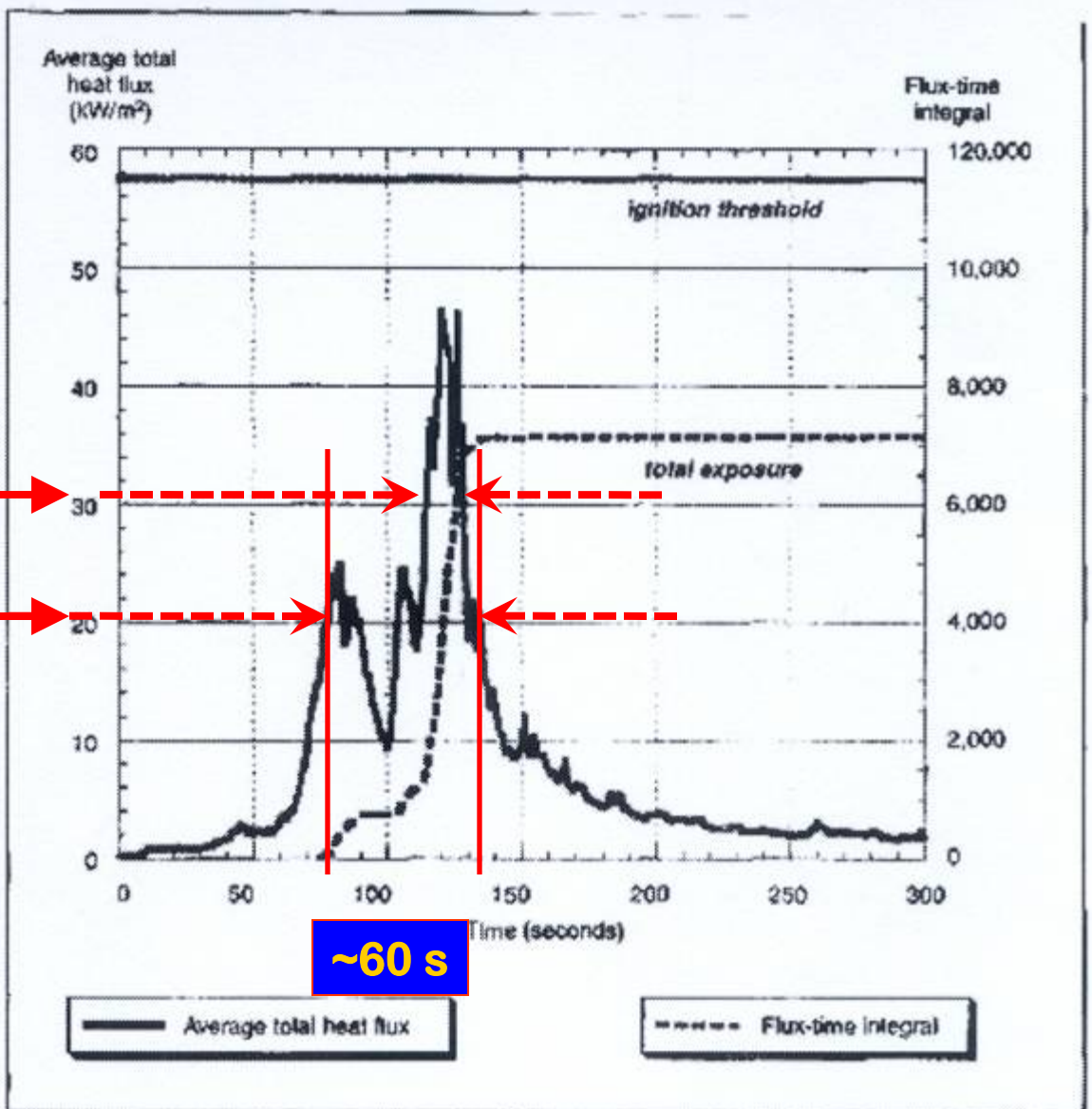


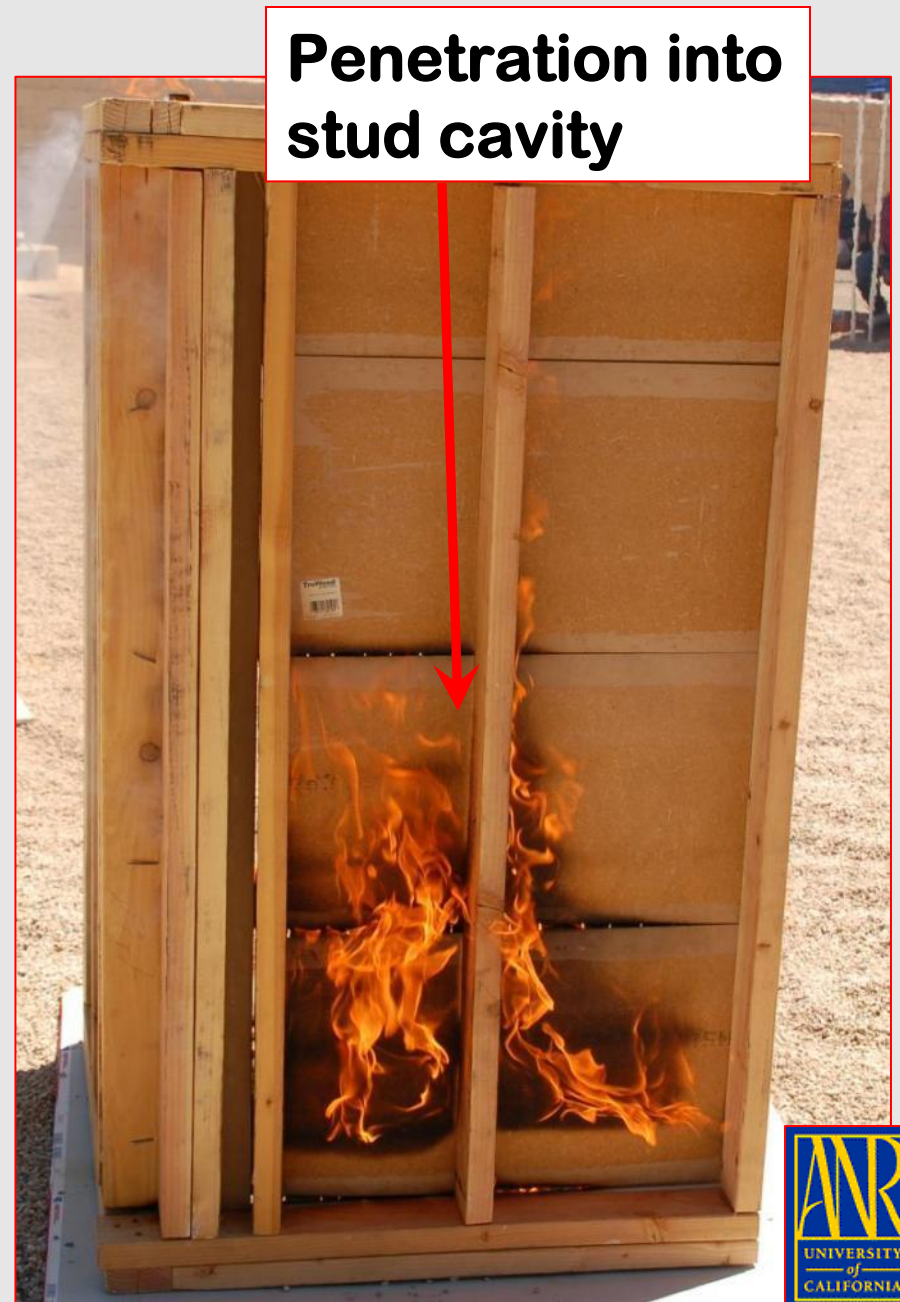
Figure 4. Actual average total incident heat flux and flux-time integral for the crown fire and 10-meter wall section shown in figure 3.

Flame impingement exposure on siding





Flame spread up the wall ...



Penetration into stud cavity



Novato Fire Protection District

Lake Arrowhead, October 2007 - home-to-home fire spread. Materials, location, *weather*...



6

5

4

3

2

1

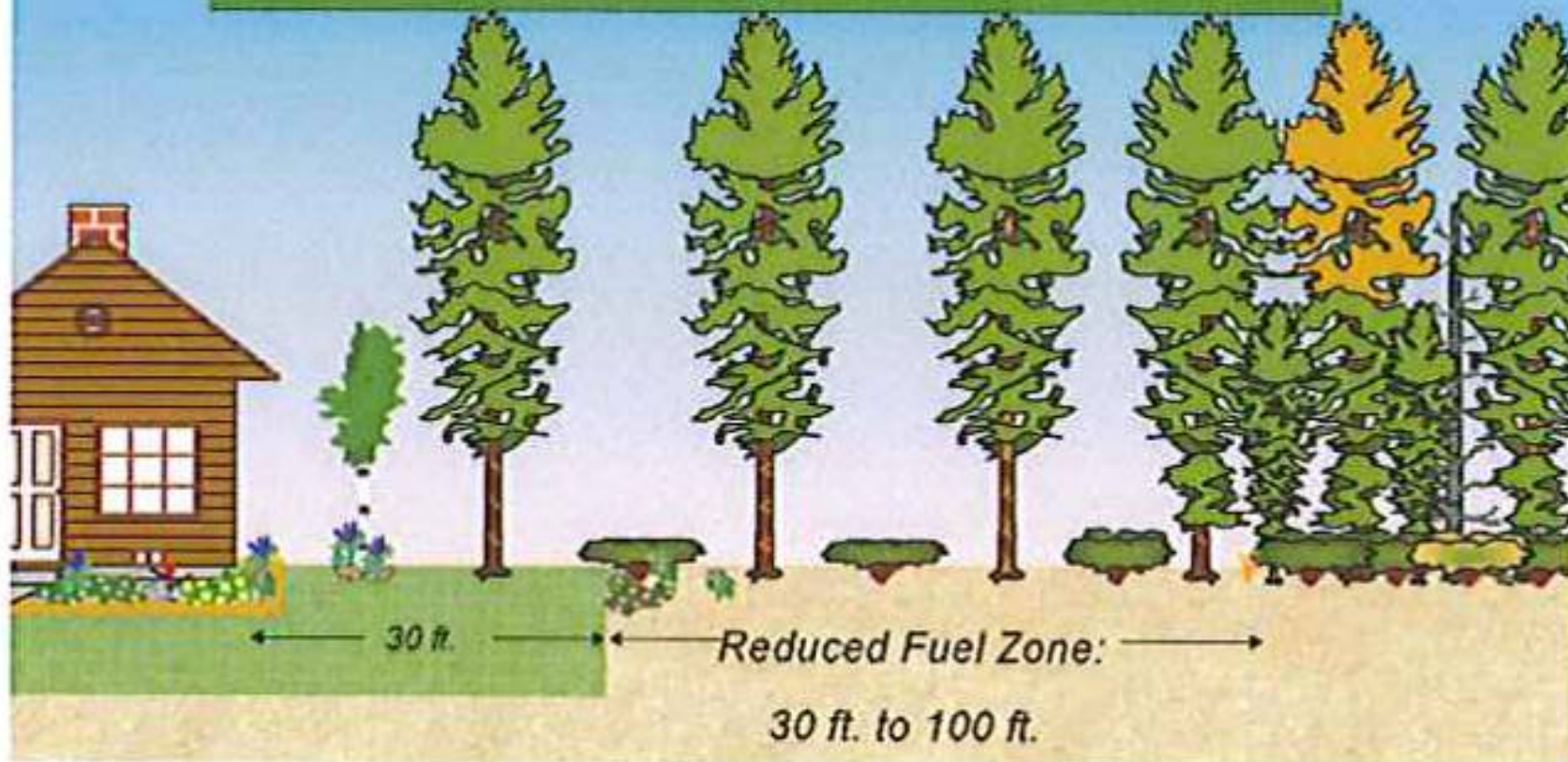


Home-to-home fire spread, along ridge line, reported wind speeds up to 60 mph.

There is an explicit link between management of near-home vegetation and your home surviving a wildfire. Both *building materials* and *defensible space* are necessary.



Defensible Space: Reduced Fuel Zone



Building Materials and Components / Checklist

✓ Roof & Edge

✓ Eave & Vents

Exposure from embers that may have been blown a mile or more. Embers can also ignite near-home vegetation and debris.

Vegetation

✓ Windows

✓ Decks & Other Attachments

✓ Siding

Ember, radiant, and/or flame impingement exposures from near-home vegetation, other structures, and wildfire


Wildland-Urban Interface Demonstration Building: Virtual Tour - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://firecenter.berkeley.edu/housedemo/>

Wildland-Urban Interface Demonstration Building

A Virtual Tour



This demonstration structure was built at the University of California Richmond Field Station in 2000. Building design and material selection decisions were made to enable discussion of the relative benefits and vulnerabilities associated with wildfire exposures.

Taking this virtual tour will allow you to consider the trade-offs that will inevitably occur when designing a building to resist multiple exposures (flames, radiant heat, and embers), and selecting materials that are durable, cost effective, and meet your aesthetic requirements.

[Take the Tour](#)

or click an area on the image on the left or any component below.

Done Internet

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<http://firecenter.berkeley.edu/housedemo>

Builders Wildfire Mitigation Guide

- Home
- Roof
- Vents
- Soffit/Eave
- Gutters
- Windows
- Decks
- Siding
- Attachments
- Codes & Standards

Information on this website was compiled by a number of people at University of California, Berkeley, and is based on input from fire tests, observations of wildfire damage, and input from those who are involved in firefighting. It is very important to realize that no (livable!) house is fire proof, but you can make it more fire-safe!

The website is organized to give you an opportunity to make changes to your home and the surroundings to reduce the possibility of damage from wildfires. Some of the changes can be done very quickly and relatively inexpensively. Others may require more effort, expense, and, in some cases, professional help.

The main part of the website begins with a list of features or parts that are of concern. If you click on any of these parts, you will go through a series of visual and text information on the specific item (say the roof or siding) that includes a definition of the possible problems and a discussion of potential solutions.



Builders Wildfire Mitigation Guide - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://firecenter.berkeley.edu/bwmg/siding.html

Builders Wildfire Mitigation Guide

Builders Wildfire Mitigation Guide

Home Roof Vents Soffit/Eave Gutters Windows Decks Siding Attachments Codes & Standards

Materials California Code Requirements Gel-Coatings

Please click one of the above links for further information on Siding.



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'HWMG'

The screenshot shows a Mozilla Firefox browser window displaying the Homeowner's Wildfire Mitigation Guide website. The browser's address bar shows the URL <http://groups.ucanr.org/HWMG/>. The website header features the University of California logo and the title "Homeowner's Wildfire Mitigation Guide". A search bar is present with the text "Enter Search Term Here" and a "search" button. On the left side, there is a "Main Menu" with links to Discussion, Components, Appendixes, Contact, Calendar, Links, News, and another Calendar. The main content area includes a photograph of a house with a red roof, a paragraph of text explaining the website's purpose, and another paragraph detailing the website's organization. A second photograph shows a house with significant wildfire damage. The browser's taskbar at the bottom shows the Windows start button and an open Microsoft PowerPoint application.

<http://groups.ucanr.org/HWMG/>



FIET

The screenshot shows a Mozilla Firefox browser window displaying the Fire Information Engine Toolkit website. The browser's address bar shows the URL <http://firecenter.berkeley.edu/toolkit/>. The website content includes a welcome message, a central navigation menu, and a list of quick links.

Welcome to the Fire Information Engine Toolkit!

Are you concerned about wildfire? These tools can help homeowners, community leaders, and researchers better understand where wildfires occur and how to protect homes and neighborhoods. To begin, click the drawer above that matches your needs.

FIRE INFORMATION ENGINE TOOLKIT

- HOMEOWNERS
- RESEARCHERS
- COMMUNITY LEADERS

Quick links:

- ◆ Homeowner Wildfire Assessment
- ◆ Evaluación de Riesgos de Incendios
- ◆ Current Fire News
- ◆ Community Wildfire Assessment
- ◆ After Fire Resources
- ◆ HFire Fire Spread Model

Developed by the Center for Fire Research and Outreach in the College of Natural Resources at the University of California, Berkeley

Center for Fire Research & Outreach
College of Natural Resources
University of California, Berkeley

Done

start Microsoft Power...

<http://firecenter.berkeley.edu>

8:22 AM

Assessment Form

Fire Information Engine: Homeowner Fire Hazard Assessment - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://firecenter.berkeley.edu/homeassessment/

Getting Started Latest Headlines Mozilla Firefox Start P...

web version | printer-friendly version

Fire Information Engine

Homeowner Wildfire Assessment



For explanatory information on specific questions, roll your mouse pointer over the question. You can also click here to see the glossary, which contains definitions for specific terms. Click here for Frequently Asked Questions.

ROOFING

1. Is your roof covering something other than Class-A fire rated? yes no n/a
2. Does your roof have any unstopped openings at the edge or ridge (e.g., open tiles)? yes no n/a
3. Is your roof, or a portion of your roof, in poor condition? yes no n/a
4. Is there vegetation or other debris in your roof valleys? yes no n/a
5. Does your roof have a complex design that might allow debris, and possibly embers, to collect? yes no n/a
6. Does your roof have open eaves (i.e., exposed rafter tails) with gaps greater than 1/8-inch between the blocking and rafters? yes no n/a
7. Does your roof have open eaves with vent holes in the between-rafter blocking? yes no n/a
8. Does your roof have boxed-in (soffited) eaves with vents in the soffit? yes no n/a
9. Does your roof have boxed-in eaves with combustible yes no n/a

Done

start Microsoft PowerPoint ... Document1 - Microsof... Fire Information Engi...



'Report Card'

Fire Information Engine
Homeowner Wildfire Assessment
REPORT CARD

Summary

Address:

This report groups your answers into **high**, **moderate**, and **low** categories. Answers that received a high rating are the most important to address immediately. Although answers falling into the low category may not require immediate attention, you should continually monitor these items because the results will differ as your home ages and your yard changes seasonally and annually.

This is only an estimate of the vulnerability of your home and its immediate surroundings to a wildfire event. Your structure could be at greater risk depending on other factors including its distance to wildland areas, the slope of your property, the amount of vegetative and other fuels within 100 feet of your home (even if those fuels are not on your property), and other factors too complex to list completely.

A brief possible solution to each issue is provided under each question. Click the + image to see more in-depth information.

Number of **highs**: 2 | Number of **moderates**: 11 | Number of **lows**: 18

HIGH



Wildfire - eXtension - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.extension.org/surviving_wildfire

ucces contra costa county


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Home About Resource Areas News Answers Calendar Self Learning Feeds Search

Wildfire

eXtension Wildfire Information Network (eWIN)

Here are some of our featured articles and activities...



Impact of Oil-Based Penetrating Stains on the Fire Performance of Deck Boards

Oil-based penetrating stains are often recommended as one of a number of maintenance procedures to extend the useful life of a wood deck.

[More...](#)

1 2 3 4 5 6 7 8 Next

In This Resource Area

Wildfire Information Network Community (eWIN)

- About Wildfire


Before Fire

Answers from our Experts

October 27, 2009

What are some good landscape plant choices for the defensible space?

This resource area was created by the: **Wildfire Information Network community**



In The News...

October 20, 2009
Surviving Wildfires Newest Resource Area on National eXtension Site

October 13, 2009
Nevada Extension Specialist Wins Silver Star for 'Living with Fire' Program

October 06, 2009
New Wildfire Safety, Prevention Rules Help Owners Make Homes a 'Defensible Space'

[More ...](#)

Resource Area Feeds

- Track all new content

Done

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www.extension.org/surviving_wildfire

[http://www.fire.ca.gov/fire_prevention
/fire_prevention_wildland.php](http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland.php)

Click on 'WUI Products'

Version (August 10, 2009)

CALIFORNIA DEPARTMENT OF FORESTRY
and FIRE PROTECTION
OFFICE OF THE STATE FIRE MARSHAL



WILDLAND URBAN INTERFACE (WUI) PRODUCTS

Published by **CAL-FIRE**
FIRE ENGINEERING DIVISION
BUILDING MATERIALS LISTING PROGRAM

Revised 08/10/09

<http://osfm.fire.ca.gov/strucfireengineer/pdf/bml/wuiproducs.pdf>

Thanks for your attention ...

**steve.quarles@berkeley.edu
(510) 665-3580**

<http://firecenter.berkeley.edu>

http://www.eXtension.org/surving_wildfire

http://cecontracosta.ucdavis.edu/Wood_Durability



**UNIVERSITY of CALIFORNIA
Agriculture &
Natural Resources**



B - brand

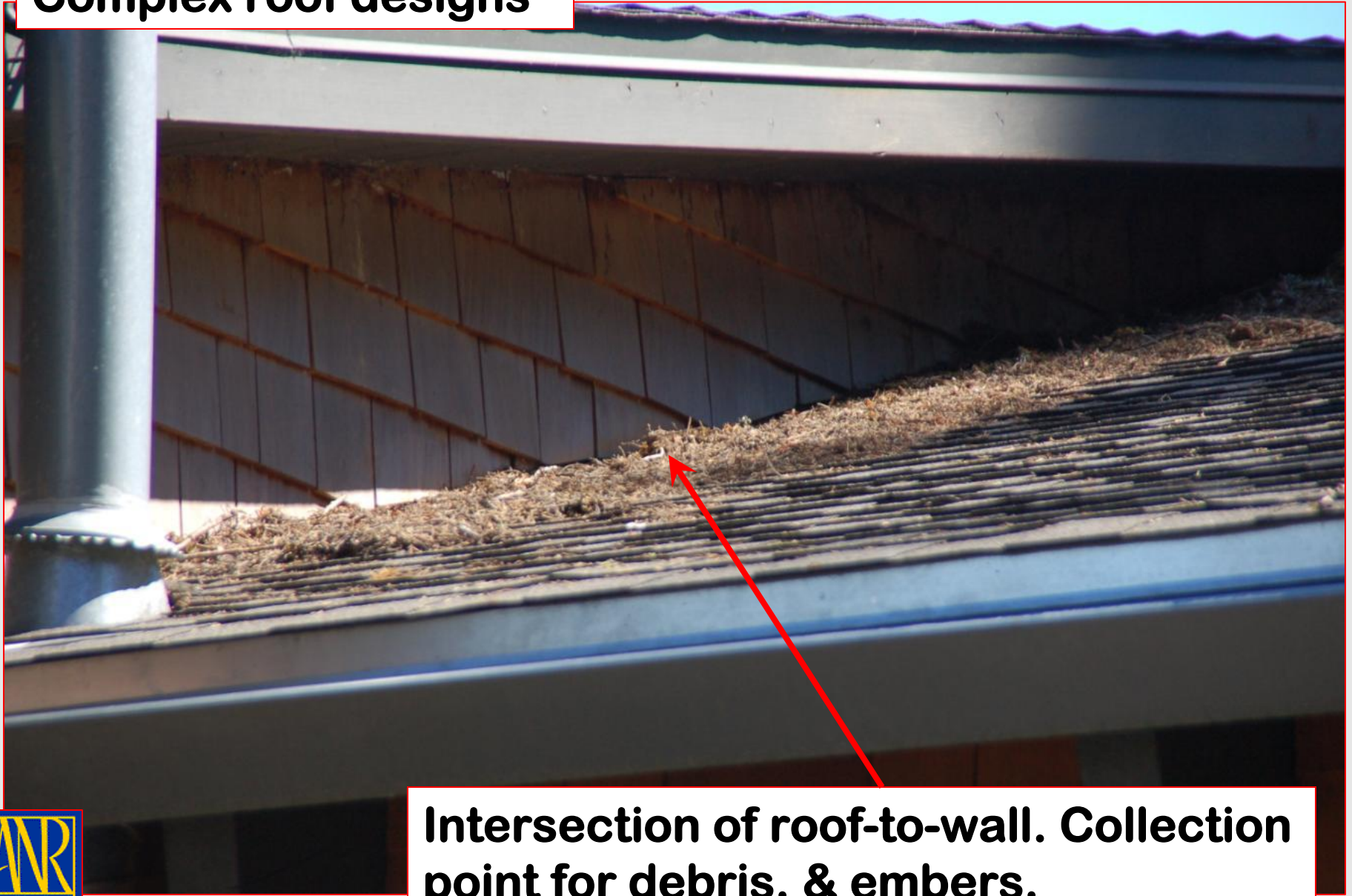


C - brand



A - brand

Complex roof designs



Intersection of roof-to-wall. Collection point for debris. & embers.

Debris in gutters - if ignited (by embers) the fire will expose roof edge, not your Class A roof covering.



Debris accumulation





Brandguard



Fireguard

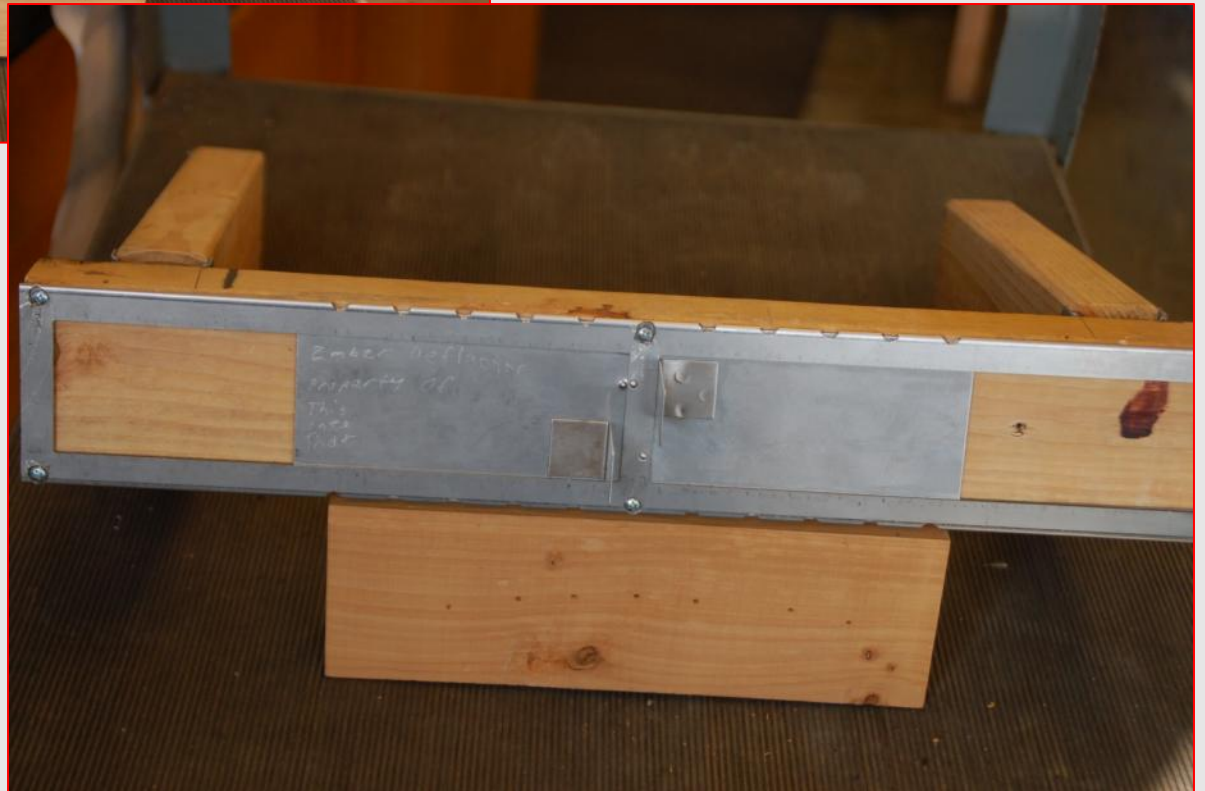
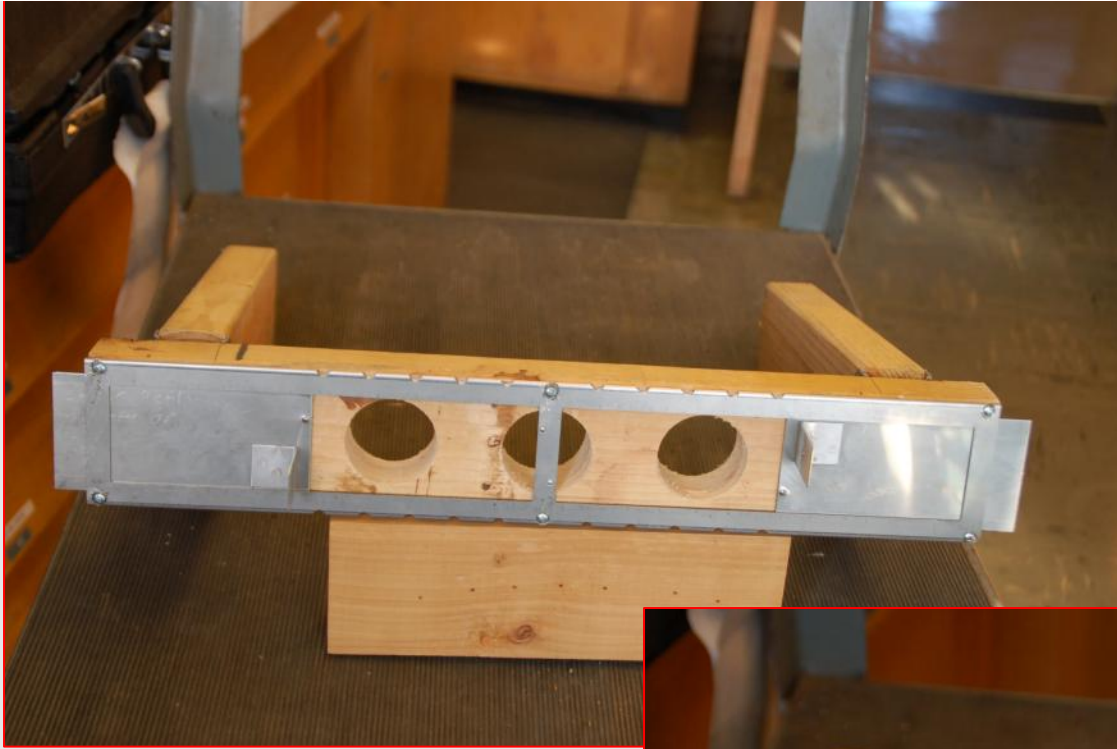


Vulcan

How about finer mesh screen?



'Ember Deflector'



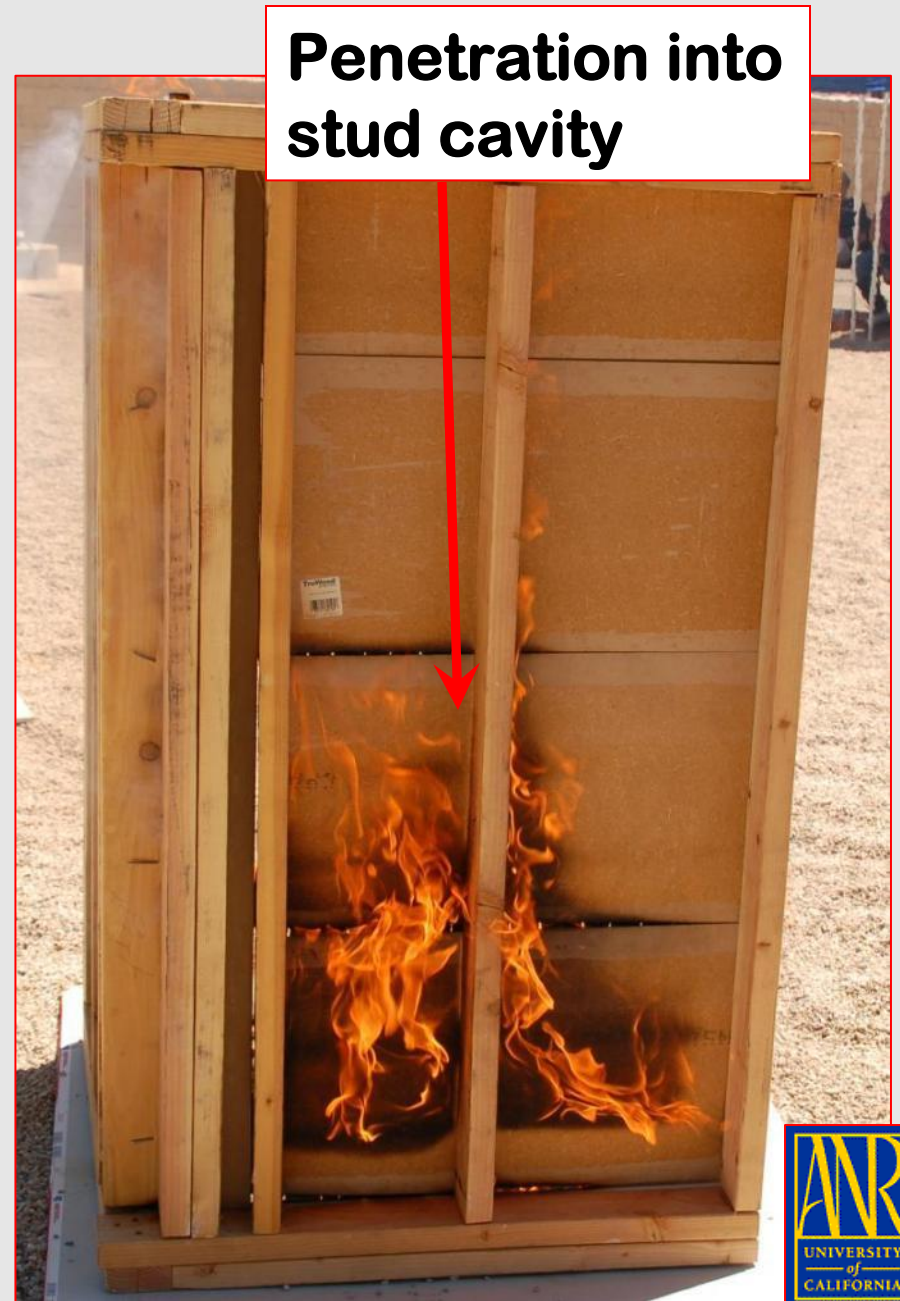
No through-roof or ridge vents.



- Use of foam insulation.
 - Thermal barrier moved from ceiling to roof line.
- The space below the insulation is conditioned space.**



Flame spread up the wall ...



Penetration into stud cavity

Open-eave framing



The glass is the most vulnerable part of the window

Frame failure

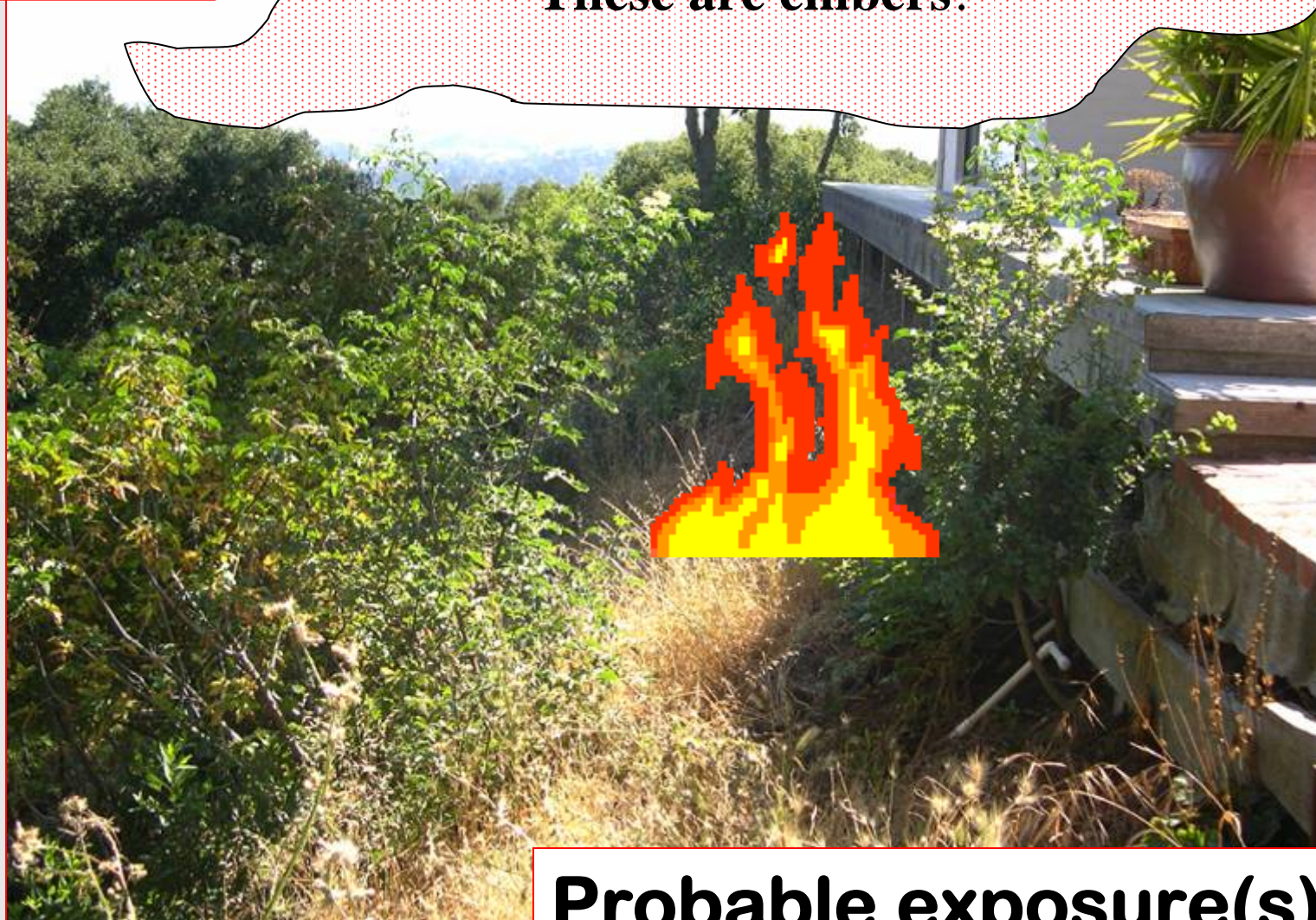


Glass failure



Decks

These are embers!



Probable exposure(s)?

Enclosing deck – potential moisture problems



Performance related to decking

WPC, not 7A compliant

'7A' compliant



Photo taken about 30 min. into test

