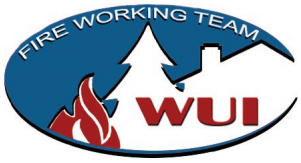
STUDY NOTES

for

Using Water Effectively in the Wildland/Urban Interface



A videotape production of the
National Wildland/Urban Interface Fire Program

Using Water Effectively in the Wildland/Urban Interface

a presentation of the

National Wildland/Urban Interface Fire Program

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Class A FIREFOAM 103B, courtesy of Fire-Trol Holding LLC, Phoenix, AZ

STUDY NOTES for

Using Water Effectively in the Wildland/Urban Interface

ABOUT THESE NOTES

This is a collection of notes that may be useful for instructors and in self-study. This is not a full instructional guide with lesson plans, activities and other audio-visuals. It is intended, as is the video, to encourage thought and consideration in discussions and planning for more effective fire protection for all fire emergencies.

Of course, no one videotape or training package contains exhaustive information on any one subject. All fire fighters and officers are encouraged to continue to explore and adjust operations to meet the changing demands of a dynamic problem such as the wildland/urban interface.

TAKE AWAY MESSAGES

During the video, the narrator makes several statements that encourage thought and discussion. The topics dealt with in the video include planning for water supplies, fire attack strategies and changing tactics, community involvement, and the adaptation of technologies for improved protection. In all, the key messages for the viewers to remember are:

1. Water is finite and often difficult to get it to where it needs to be.
2. Planning is key to success, practice, and simulation; practice and simulation are key to successful suppression.
3. Firewise Communities, properly maintained, will require fewer resources because of mitigation practices within and around the boundaries and around the homes.
4. Technology offers help in water conservation through the use of water additives (foams and gels).
5. Training equates to safety (e.g., driver training, application training).
6. Fire fighters should be engaging homeowners to do the clearance in advance of interface fires as this maintenance should not be the responsibility of fire fighters who could be better assigned to fire attack and suppression.
7. Fire departments not already doing so should consider the use of remote, portable water sprinklers, fire gels and Class A foams·
8. Fire departments should be adept at changing strategies (from offensive to defensive) and accompanying tactics that are often required during interface fires.

These points are key to understanding and applying the information in the video. Instructors should use these to reinforce the information and relate it to local conditions.

Background Information

An earlier product of the National Wildland/Urban Interface Fire Program was *Operation Water: Planning for Water Supply and Distribution*, a video and booklet provided explained how to determine the quantity of water needed for key structures and how to locate adequate water sources and construct dry hydrant systems to access remote water supplies. This publication and video recognized the unusual demands of fires in interface areas in which both burning vegetation and structures posed a more difficult situation than either of the fire incidents independently. If your fire department is exploring the use of alternative water supplies for expanding areas of protection, we suggest, as a start, you use *Operation Water*, based in part on NFPA 1142: *Standard for Water Supplies for Suburban and Rural Fire Fighting.*

This new program, Using Water Effectively in the Wildland/Urban Interface, will help you develop new approaches to using your water supplies as well as helping to change the way your department addresses the risk to interface residences and structures, through Firewise Communities preparation and mitigation.

This project was launched in 2003 by the National Wildland/Urban Interface Fire Program[1] to stimulate thought and discussion among officers and members of local fire departments as to how to best use an important resource. Once the department has done the planning, located possible water sources, signed agreements for the access to and the use of those water sources, and installed dry hydrants (as needed), the testing and maintenance of the system along with regular practice in using them helps to ensure that the fire protection level of service has indeed been improved.

The NWCG Wildland/Urban Interface Working Team[2] believes that a wise use of resources in the wildland/urban interface is the preparation of homes and structures to withstand a wildland fire through Firewise mitigation measures.

Research and case studies have shown that home ignitions are most often the result of ember showers that deposit firebrands into small crevices and on flammable materials near or part of the house. Ignition of structures usually occurs from 30 minutes to two hours after a major fire front has passed. This time will allow for fire departments to use water more effectively and protect the lives of fire fighters and residents by not putting either in the path of a wildland fire. In fact, properly created and maintained, Firewise mitigation measures will allow fire departments to better use ALL resources.

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[1] The National Wildland/Urban Interface Program is directed by the National Wildfire Coordinating Group's Wildland/Urban Interface Working Team (WUIWT), a consortium of wildland fire organizations and federal agencies responsible for wildland fire management in the United States. The Working Team is composed of representatives from the USDA Forest Service, the USDI Bureau of Indian Affairs, USDI Bureau of Land Management, USDI Fish & Wildlife Service, the USDI National Park Service, the Federal Emergency Management Agency, US Fire Administration, the International Association of Fire Chiefs, the National Association of State Fire Marshals, National Association of State Foresters, the National Emergency Management Association, and the National Fire Protection Association.

[2] The NWCG Wildland/Urban Interface Working Team is composed of representatives from the USDA Forest Service, the USDI Bureau of Indian Affairs, USDI Bureau of Land Management, USDI Fish & Wildlife Service, the USDI National Park Service, the Federal Emergency Management Agency, the US Fire Administration, the International Association of Fire Chiefs, the National Association of State Fire Marshals, National Association of State Foresters, the National Emergency Management Association, and the National Fire Protection Association.

Of course, the best mitigation measures are taken long before fire season. Engaging homeowners and residents in the process of community fire mitigation is yielding effective and long-term mitigation. When residents form Firewise committees or boards within the development, they are on the first steps to becoming recognized as a Firewise Communities/USA site. Demonstrating citizen commitment and agency cooperation in reducing wildfire risk is what is making a difference in the wildland/urban interface – house by house, neighborhood by neighborhood, community by community. For more information on the Firewise Communities/USA Recognition Program, write to: Firewise Communities, 1 Batterymarch Park, Quincy MA 02169 or visit *www.firewise.org/usa.*

ISO Public Fire Protection Ratings and Water Supplies

Fire suppression depends on the availability of water. As a primary element of a fire protection delivery system, plentiful water resources are the key to effective suppression. Too many times fire departments lamented that they could have saved a structure if they hadn't run out of water.

Besides the need for plentiful water, the best fire departments constantly seek the most effective and efficient ways to get the water to a fire. In fact, the community's insurance rating depends on how well the fire department can demonstrate their ability to fight structure fires.

The Insurance Service Office's (ISO) Public Protection Classification (PPC™) is the most used measure to assess a fire department's level of service to the citizens of its community. In determining the Public Protection Classification for a community, ISO evaluates the community fire department's capacity to fight structure fires. We then assign a Public Protection Classification from 1 to 10. Class 1 represents the best public protection, and Class 10 indicates no recognized protection.

By classifying a community's ability to suppress fires, ISO provides crucial information for understanding the entire landscape of risk associated with a specific property. We have extensive information on more than 43,000 fire-response jurisdictions. Here's how it works:

Fire alarms
Ten percent of the overall grading is based on how well the fire department receives fire alarms and dispatches its fire-fighting resources. ISO field representatives evaluate the communications center, looking at the number of operators at the center; the telephone service, including the number of telephone lines coming into the center; and the listing of emergency numbers in the telephone book. Field representatives also look at the dispatch circuits and how the center notifies fire fighters about the location of the emergency.

Engine companies
Fifty percent of the overall grading is based on the number of engine companies and the amount of water a community needs to fight a fire. ISO reviews the distribution of fire companies throughout the area and checks that the fire department tests its pumps regularly and inventories each engine company's nozzles, hoses, breathing apparatus, and other equipment. ISO also reviews the fire-company records to determine the type and extent of training provided to fire-company personnel, the number of people who participate in training, fire fighter response to emergencies, and the maintenance and testing of the fire department's equipment.

Water supply
Forty percent of the grading is based on the community's water supply. This part of the survey focuses on whether the community has sufficient water supply for fire suppression beyond daily maximum consumption. ISO surveys all components of the water supply system, including pumps, storage, and filtration. To determine the rate of flow the water mains provide, ISO observes fire-flow tests at representative locations in the community and, finally, evaluates the distribution of fire hydrants.[3]

Currently, over 17,000 fire departments in the United States are at the lowest ISO Classes (9 and 10), largely due to the availability of water and an effective means to deliver it to a fire. Water is a foundation of fire suppression, whether for structures or for wildland fires.

NFPA 1142: ***Standard for Water Supplies For Rural And Suburban Fire Fighting***

This public fire protection standard from the National Fire Protection Association provides guidance in determining the total amount of water that might be required for a structure fully involved in fire. The formulae in the standard base the quantity on the total volume (cubic feet/meters) of the structure, its construction and occupancy classifications, and exposure hazards and do not provide indications of rates of flow (gpm).

The assumption for total quantity is that, because of a lack of essential personnel required to operate safely at a fire scene, a delay in getting the alarm of fire or responding to the fire, or other reasons, the fire could not be stopped before total involvement – a worst case scenario.

For that reason, strategic thinking is required about:

1. Which hazards in the community present major threats to life safety (nursing homes, hospitals), exposure (chemical or flammable storage) or the sustain ability of the community (major employer).
2. Where the most appropriate source; and,
3. The most effective and efficient method of transporting water to the location might be.

The standard also provides information in its annexes on the construction and locations of dry hydrants, water hauling from point to point and the text of the ISO Guide to Fire Flow Determination.

[3] Source: www.ISO.com

1. Introduction: This Time Things Are Different

KEY POINTS

This program will guide you through several options for the effective planning and use of water supplies in interface fire situations. While these are presented in a general discussion fashion, examine the use of those that your department might be able to adopt easily.

- Regardless of where you get fire fighting water supplies now, wildland/urban interface fire change, the dynamics of fire behavior and presents *new* water logistics problems.
- Your fire department needs an area water supply plan. If your department doesn't have one or hasn't updated it recently, do it long before fire season.
- The position of water supply officer is necessary at every fire.
- Prepare your fire fighters and officers to expect a *whole neighborhood* of structures either on fire or threatened.

YOUR NOTES

Questions for Discussion or Thought

These questions are provided to stimulate discussion and are not the only issues that might come up in a presentation on the subject of effective water use in wildland/urban interface fires. In some cases, at least one suggested response is supplied for each question.

1. The narrator states that the needs of water for structure fire suppression and wildland fire suppression are different. What are some of the differences?

2. What are some of the duties of the water supply officer? (Check NFPA 1142: *Standard for Water Supplies for Rural and Suburban Fire Fighting*.)

2. So What Do You Do?

KEY POINTS	YOUR NOTES
This section of the video sets up the scenario for planning water supplies and using them effectively. As an instructor, you might want to make or find a map of the local area to stimulate discussion or for comparison of the exposed structures to the forested/wildland areas.	

3. Pre-Fire: Strategy & Assessment

KEY POINTS

YOUR NOTES

Structure Ignition Potential

- Depending on the vegetative fuels and wind, a wildfire can project burning embers up to a mile ahead of the flame front. As these firebrands shower down on homes and structures, incident responders should expect multiple ignitions on and around homes. Some of these ignitions may not threaten or ignite a house for up to as long as two hours.

- In light of multiple ignitions, aggressive offensive strategies (fire attack plans) may still be effective to limit the fire spread.

- A resident can help avoid disaster by practicing Firewise maintenance — such as removing pine needles on the roof and in the gutters. Fine fuels in a yard or next to a house could easily be ignited by firebrands or carry a surface fire that would jeopardize the home.

LCES

- Then just before the fire arrives, move to your Safety Zone within the community and let the fire pass through. This, of course, means that members of the department, state forestry, national forests, other applicable land management agencies (etc.) have worked closely with the neighborhood association to develop community safety zones long before fire season is on top of you.

- By staying inside the residential development, you can return (re-engage) sooner to mop up or overhaul any structure starts or spot fires that threaten structures.

Structure Survival Decisions

- Triage the homes for *extreme conditions*. How structures can be effectively protected will depend upon how well the residents have prepared their homes. If more and more homeowners were to apply Firewise principles, you'll use even less water because you'll have fewer ignitions from flammable materials.

- Apply your knowledge of the fire behavior and the ignition potential of these structures. Then determine the level of protection that each one will need.

- Balance the needs of the entire neighborhood against the resources available to you.

Nine WUI "Watchout" Situations [4]

Always be aware of the safety concerns. Become familiar with these special "watch out" situations for wildland/urban interface fires.

1. Wooden construction and wood shake roofs
2. Poor access and narrow congested one-way roads
3. Inadequate water supply
4. Natural fuels closer than 30 feet to structures
5. Extreme fire behavior
6. Strong winds
7. Need to evacuate the public
8. Structures located in chimneys, box or narrow canyons, or on steep slopes in flashy fuels
9. Inadequate bridge load limits

[4] from Fireline Safety Reference NPS Branch of Fire Mgt. 3056 Elder St. #A Boise ID 83705

Questions for Discussion or Thought

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1. A home or community built with Firewise principles in mind could resist ignition without assistance. Give an example of how water could be wasted around a Firewise structure. *Spraying water on a fire-resistant roof would waste resources and time*.

2. The way a property is maintained can mean the difference between success and failure. Give an example of how maintenance can help a structure survive. *Making sure metal screens are in good condition on windows, gutters are clear of pine needles and dry leaves, and flammable materials (wood piles, patio furniture, etc.) are not close to the house.*

3. It's not the tall flame front that causes the majority of structure losses in an interface fire. This fact is supported by experimentation and experience, and observation. One of the most revealing reports is one concerning the Los Alamos NM fire of 2000. A copy of the report is included at the back of this guide. Discuss how this could be true in your area and how to prevent the small ignitions from destroying or damaging homes.

4. As a wildland fire approaches and directly threatens a residential development, it's definitely time to shift from what kind of strategy to another one. Offensive to defensive or defensive to offensive. Which? HINT: Instead of trying to *stop* the fire, you'll now have to do your best to prepare homes in the fire's path so that they'll *withstand* it – without your forces being placed in danger.

4. Pre-Fire: Preparation

KEY POINTS

YOUR NOTES

How do you "prepare" a structure?

- Sometimes your most efficient use of water involves *not using water*. Your instinct may be to charge the hose line and drench the home and yard. But that would waste water and time. You may deplete your water supply and leave the rest of the neighborhood unprotected.

- A heavy stream works well to extinguish structural fires, but in most situations would deliver too much water to too small of an area. Not only would it be overkill, it would defeat the need to stay mobile. You'll wet down a larger area faster than you would with a straight stream while consuming less water.

- There are *Two Prime Objectives* in preparing a home for an approaching wildfire:

    1. *Remove as much flammable vegetation and other materials (e.g., lawn chair cushions, wooded chairs, tables). Doing this, you'll both reduce or eliminate fuel and conserve your water. (You'll need that water for the second objective.)*

    2. *Increase the moisture level of the surrounding vegetation closest to the house. You won't need to drench the entire yard. Rather, you want to raise the moisture level of the dry fine fuels next to the home and as time and water quantities are available wet dry vegetation in the yard and vulnerable parts of the house.*

***Important Point* — You waste water by wetting down any green, moist areas around the house and any non-combustible construction elements of the house (like a Class A rated roof or non-combustible siding or decking).**

Water Sprinkler Systems

- Yard sprinklers may be able to treat a lot more area to the same amount of time as having personnel with a single hose line treating that same area.

- But sprinklers don't always get into vulnerable nooks and crannies. A hose may finish the job.

- Even using home sprinklers may be able to raise the moisture level in the vegetation close to the structure long before the fire arrives.

Water Additives: Class A Foam

- Even though Class A foam is mixed a low ratio to water, it can make your water go a lot further. In fact, it can reduce water usage by *as much as two-thirds*.

- Foam can also be very effective at covering vulnerable nooks and crannies, and fine fuels. But foam will only last up to an hour. And it doesn't apply well in high winds.

- Class A foams that meet NFPA 1150: *Class A Foam Chemicals fro Fire Fighting* are biodegradable and can be washed off fairly easily.

- For more information on using Class A foam for structure protection and fire suppression, refer to NFPA 1145: *Guide for the Use of Class A Foams in Manual Structural Fire Fighting*, 2000 edition.

Water Additives: Gels

- Gels stick well to vertical surfaces, and provide good radiant heat protection.

- However, gels are more expensive and require mixers and special nozzles. They can also leave a residue that is difficult to remove.

Why Firewise Mitigation Is Important

- Structures lost in wildland fires have been most often ignited between 30 minutes and over two hours ***after*** the flame front had passed or have been ignited by lofted firebrands.

- Homes tend to be lost to the small things, like pine needles in a gutter igniting the fascia board and spreading into attic areas; through tiny

gaps around doors, windows and siding joints; and light fuels under a wooden deck ignited by firebrands.

- The more prepared and maintained homes are long before the fire approaches the better their chances of survival.
- Firewise homes significantly reduce the need for individual concentrated protection from stretched resources.
- Firewise homes with Firewise landscapes have provided fire crews safety zones and staging areas as the wildfire passed around them.
- However, the preparation and maintenance of the home ignition zone is best and most appropriately done by the homeowner or resident on a continuing basis rather than relying on busy fire fighters to "clean up the yard" during a major emergency.

INTERVIEWS USED IN SECTION 4

LEE BULLER (Creston, Montana, Fire Department)

1. *In doing mitigation we try and go in and limit the use of water to start with. And try and remove the brush and debris away from the house and off of the house.*
2. *If they've got a garden house or a spigot, outside, we'll try and use that water to wash off the deck or the roof or the pine needles and try and just use their water instead of using the water that's in the truck.*
3. *If there's a lot of debris in the gutters, in the gutters drain systems, or up on the house, we'll try and remove those. If it's easier to just take the gutter down, sometimes that's very feasible and especially with light plastic or vinyl gutters, they have a chance to catch on fire and be the ignition source of the house. If they have a bunch of lawn furniture or stuff sitting on the deck, we'll take it and remove that from the house and get it away. That kind of stuff catches a lot of embers and we try and do this all before the fire comes and then we will have our water available to use if it does start burning, we'll be able to use that water to put that out.*
4. *And if it keeps you from having to go to the dump tank one time, then you're able to stay there, it just helps you prolong your time before you have to leave that house to go get more water or have more people bring you water. Every little bit helps, so any time you can save water, you try and look for that.*
5. *Using gels over plain water buys you a lot of time. If you put water on a house it'll dry up and be gone. Even after the gel dries it still does you a lot of good on the house and a lot of times you'll have time to come back and pre-treat the house - just wet that gel down a little bit.*

JEFFREY STANOVICH (Massachusetts Forestry Service)

1. *What we look for is the proximity of the vegetation to the structure. If we're dealing with a lot of vegetation within a 30 foot buffer zone, we want to try and thin that down as much as best we can, as quick as we can depending on the rate of the spread of the fire. We don't have to clear everything out, but we want to try and get good separation in the tree canopy 15, 20 feet, so maybe every other tree of something you might want to thin out at the location.*
2. *I can put that garden hose into my booster tank, to recover what water I'm using so I'll still have as close to a full tank supply in my engine. And as the fire approaches, that's when I start using my water, very sparingly. As I get ignition, I try and get extinguishments.*

SETH CARBONARI

1. *The nice thing about sprinklers is we don't have to be there when the fire comes through, you're able to back off and leave that sprinkler in there, you're still applying the water as long as water sources [are] available.*
2. *You're able to set up a bunch of sprinklers to treat a lot more area to the same amount of time - continuously treating the areas whereas one person bumping from nozzle to nozzle's going to take a lot longer to treat that same area.*

Questions for Discussion or Thought

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1. Are additives, such as foams and gels, used in your department? Do they work? What would you say to recommend them to other departments?

2. If the wildfire is imminent, what should be your action regarding water or water additives on the structure? W*et the side of the structure that will take the radiant heat exposure. And then spray any vulnerable places such as the flammable inside-corners and under decks.*

3. Whether you're using additives or water or dealing with light or heavy fuels, you want the water or additive to do what, according to the video? *You want the water or additives to soak in, not run off.*

5. Water Resources

KEY POINTS

Remember, your apparatus is limited. You can't deliver water to <u>every</u> structure.

Think *<u>strategically</u>* **about your resources and actions**

- First, identify several water sources. If one gets cut off by the fire, you'll have a "Plan B" or "C" to fall back on.
- Second, make sure your resources and equipment aren't in the path of the flames. That way, they'll be protected when the flame front burns through.
- And third, protect any bridges or infrastructure that link you to your resources — or serve as an escape route — so you won't get cut off.

Accessing and delivering water

- First of all, don't overlook any potential domestic sources. Many homeowners today have water tanks on their property. Some have swimming pools. And many subdivisions contain cisterns.
- Tap into these sources with a pump and preserve your *own* water resources for later.

Portable Water Tanks

- Location is critical in interface fires.
- You might dedicate one to a single structure with a portable pump, just as you would during a structural fire.
- Develop your water supply plan for different protection scenarios
- PRACTICE
  With real apparatus, drivers, and <u>water</u>!

Fire Hydrants

- The scenario presented in the video assumed there were none, but if you have an in-ground pressurized system…
- First, your engine and pumpers can't use them as they normally would with a structure fire.

YOUR NOTES

- If the fire suddenly flared up and you had to escape, you'd have to stop and detach your hoses first. Some departments have lost equipment and injured fire fighters simply because they didn't have time to detach.

- Use hydrants as a fill place for apparatus. Stay mobile — and safe.

- And speaking of hydrants, not all fire departments use the same size connectors. Not having compatible equipment with nearby responding fire departments can end in disaster. (Hint: review the reports of the 1991 Oakland CA fire.)

- Make sure you have appropriate adaptors for your hydrants and hoses and provide adaptors to any mutual aid partners.

Before the wildfire reaches the community

- Mitigate (lessen) the exposure hazards around as many homes as possible.

- You can't prevent every ignition. The goals is to reduce each structure's risk so that it won't become involved as the fire front passes through.

- If more homes here had applied Firewise principals, your teams could have worked more effectively — and mitigated more homes.

Questions for Discussion or Thought

These questions are provided to stimulate discussion and are not the only issues that might come up in a presentation on the subject of effective water use in wildland/urban interface fires. In some cases, at least one suggested response is supplied for each question.

1. What should be the role of the department's Water Supply Officer in planning for water access and movement?

2. How would you explain to residents of a recent wildfire that your engines just couldn't use the hydrants that their taxes had paid for?

3. What non-pressurized water sources does your department have now? Does the department PRACTICE water supply evolutions on a regular basis?

6. During The Fire & Mop Up

KEY POINTS

As the fire approaches, it's time to move to your safety zone.

- If your **safety zone** is ***within*** **the neighborhood**, you can still use this time to extinguish spot fires that threaten structures.
- Make your reserve last. Don't use your water without first assessing the situation.
- If your **safety zone** is ***outside*** **the neighborhood**, take this time to reorganize and plan your re-entry.
- Refill your apparatus. And decide which engines will go to which areas.

Once the firefront has passed through the neighborhood, reenter quickly as soon as it's safe.

- Shift from defensive to offensive mode.
- Concentrate on structures first by extinguishing and overhauling any structure ignitions or spot fires that endanger structures.

Prioritize.

- Some homes may need immediate attention.
- Others may be so involved that you couldn't save them no matter how much water you have.
- Walk around the entire structure. Check any place that embers might collect and ignite it if left unattended.
- Take the time to check on foot. Drive-by checks can overlook a small start and cause you to lose a home.

YOUR NOTES

INTERVIEWS USED IN SECTION 6

SETH CARBONERI

It's really important to go back in and check out each structure after the fire's passed through. It can be any number of things duff, or heavier fuels that still are, still have some kind of fire in them that could spread back into a structure.

JIM STANOVICH

Firebrands and embers will hide themselves into the most unbelievable locations in and around the structure. So hours after you leave that structure doing structural protection, you may return and find that home has ignited. So you want to go back and really double check everything two three times. Over a good long duration of time, three four five six hours, sometimes even ten hours you want to go back and return. The embers can get into some real crazy places, smolder a while, and uh, then you get ignition and you've got a problem if no one else is around.

LEE BULLER

You're usually dealing with just a small spot fire. You're dealing with a handful of pine needles that are burning, and a half a gallon of water will put that out. Whereas if you wait for fifteen twenty minutes, you're going to be looking at two or three trucks to actually put that out and its going to be a whole lot more of a problem.

Questions for Discussion or Thought

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1. What does the narrator imply by the statement that "*not all* fires present an imminent danger to structures"?

2. At what point might a back-pack pump be your best water delivery device? Why? *It will extinguish most small ignitions — and permit your crews to cover a lot of ground quickly. You won't need a lot to put out a spot fire. Even a shovel-full of dirt could to the trick.*

3. How might you patrol more structures in a more efficient time during mop up? *Designate an engine to patrol the neighborhood and resupply the hand crews.* Are there other methods that you have used or would like to try?

7. Conclusion: Plan in Advance

KEY POINTS	YOUR NOTES
• A successful operation begins long before a wildland fire arrives. • The residents in your community play a crucial role in your effectiveness. • By applying basic Firewise principles they can make the difference between your success and a disaster. • Success also requires a new way of thinking. • As we've seen in this scenario, how you *get* your water matters less than how you *use* it. • And being mobile and thinking on your feet matters more than how much water you have.	

Questions for Discussion or Thought

These questions are provided to stimulate discussion and are not the only issues that might come up in a presentation on the subject of effective water use in wildland/urban interface fires. In some cases, at least one suggested response is supplied for each question.

1. After viewing this video and discussions, how might your strategies and tactics for interface fires be adjusted to accommodate more Firewise structures in the area?

2. Discuss the possibilities of extreme fire behavior in an interface fire and what impact extreme behavior might have on your water supply plan and operation.

Other resources for more information:

- Effective Fire Protection: A National Concern
- *Public Protection Classification (PPC™) Service*
  ISO website: www.iso.com

- *Operation Water: Planning for Water Supply and Distribution* (Booklet and video)
- *Fire fighter Safety in the Wildland/Urban Interface* Video Series (Training Guide, 3 videos and CD-ROM or Training Guide and 1 DVD)
  Available through the Firewise website: www.firewise.org

- NFPA 1142: *Standard for Water Supplies for Rural and Suburban Fire Fighting*
- NFPA 1143: *Standard for Wildland Fire Management*
- NFPA 1145: *Guide for the Use of Class A Foams in Manual Structural Fire Fighting*
- NFPA 1150: *Standard Class A Foam Chemicals for Fire Fighting*
  Available from the National Fire Protection Association: www.nfpa.org

Examination of the Home Destruction in Los Alamos Associated with the Cerro Grande Fire July 10, 2000

Jack D. Cohen
Research Physical Scientist
USDA Forest Service,
Rocky Mountain Research Station
Fire Sciences Laboratory
Missoula, Montana

I arrived at Los Alamos on May 14, 2000 to conduct an examination of the home destruction associated with the Cerro Grande Fire. My examination occurred between the afternoon of 5/14 and late afternoon on 5/16. I had contact with the southern command post incident management team, the Los Alamos Fire Department, and the Santa Fe National Forest.

The homes were destroyed as the main body of the Cerro Grande Fire burned past Los Alamos to the north-northeast and then toward the northeast between about 1700 on 5/10 to the early morning hours of 5/11. About 200 single and multi-family structures were totally destroyed or irreparably damaged. Although fire suppression actions saved homes, the high ignitability of most of the residential area allowed numerous simultaneous house fires that quickly overwhelmed the suppression forces.

1) Although the Cerro Grande Fire burned as an intense, continuously spreading crown fire (fire spread through the tree canopy) in certain areas, within several hundred yards or more of the Los Alamos residential area it burned as a surface fire—an under burn. The pictures show tree canopies that were variably scorched but not consumed next to totally destroyed homes.

Photo 1—The crown fire burned on the ridge (mid-picture) west of Los Alamos.

Photo 2—The fire burned only in surface fuels as it came from the wild land in the background toward the residential area. The wild land fire commonly burned through continuous fuels to encounter and burn through heavier residential fuels such as woodpiles (bottom right), flammable shrubs, heavy pine needle beds, and homes.

Photo 3—Within the residential area, separated by several streets from the wild land, the fire generally burned as an under-burn with scorched but unconsumed tree canopies. The surface under the trees in the foreground did not burn, but the house to the left was totally destroyed.

2) Commonly homes were totally destroyed with the tree canopies leading up to and adjacent to the structures remaining unconsumed. The canopy consumption that occurred adjacent to and downwind from homes occurred from burning homes. With the exception of two local and limited areas where crown fire occurred adjacent to the residential area, a surface fire spread into Los Alamos. The unconsumed vegetation surrounding destroyed homes indicates that these homes were exposed to a low intensity surface fire, not a high intensity crown fire. Many of the homes destroyed, particularly

the 4-plexes on the northwest side (*Photo 6*), occurred from structure-to-structure spread (communication with Steve Coburn, LAFD). In general, the intense wildfire burned past the residential area to the west and north of Los Alamos. Scattered islands of destroyed homes at the community margin suggest low firebrand exposures and low spotting potential during the late night and morning hours during which much of the residential area burned.

Photo 4—The unconsumed, moderately scorched tree canopy along with the remaining wood rail fence indicate that this home was exposed to a low intensity surface fire. The high intensity wildfire burned on the hills in the background.

Photo 5—This totally destroyed home was within the residential area. A road separated it from other burning vegetation and homes. The unconsumed vegetation with little scorch indicates that the fire intensity surrounding the home was low. This suggests that firebrands (burning embers from other fires) ignited the home directly and/or in adjacent flammable materials that spread to the home.

Photo 6—Significant structure-to-structure fire spread occurred from flames and firebrands in an area of multifamily residences. The unconsumed vegetation surrounding the corridor of destruction indicates that the high fire intensities were due to the burning structures.

3) My examination suggests that the abundance and ubiquity of pine needles, dead leaves, cured vegetation, flammable shrubs, wood piles, etc. adjacent to, touching and or covering the homes principally contributed to the residential losses. Discussion with the Los Alamos FD indicated that few wood roofs existed and thus were not a significant factor. In many areas of home destruction a continuous ponderosa pine (*Pinus ponderosa*) canopy existed within the residential area. This produced a continuous pine needle fuel bed to the homes as well as pine needles deposited on the homes (roofs and gutters). An examination of surviving homes in areas of home destruction indicated that a low intensity surface fire in pine needles could burn to a home and ignite its wood siding. In several cases, a scratch line that removed pine needles from the base of a wood wall kept the house from igniting. Firebrand ignitions likely started fires in these pine needle fuels in areas within the community that were separated by streets.

Photo 7—The tree canopy, shrubs, pine needle bed, and woodpile adjacent to and touching this Los Alamos home represents a common situation.

Photo 8—The surrounding ponderosa pine canopy deposited pine needles on this roof. The roof surface fire burned the needles without igniting the roof. The roof covering types were "built-up" gravel and composition shingle. The house did not have gutters to accumulate needles, potentially ignite and thereby ignite the eave edge. Although the neighboring home was totally destroyed (in the background) the tree canopies did not burn. The roof pine needle fire likely ignited from firebrands generated by the burning home next door.

4) That portion of the Cerro Grande Fire that burned into the community generally spread as a relatively low intensity surface fire, not as a high intensity crown fire. Homes ignited and burned from wildfire flames and firebrands that did not burn tree canopies and other vegetation in the same area.

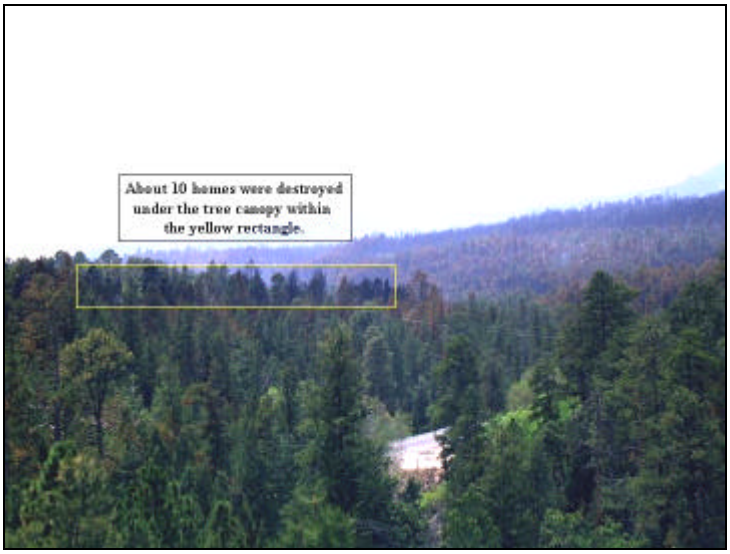

Photo 9— This is the Pueblo Canyon area looking southwest toward Ridgeway Road (within the yellow rectangle) with North Road visible towards the bottom of the photo. The Cerro Grande Fire burned as a crown fire on the slope in the background but as a surface fire in the foreground. Close inspection reveals torched trees within the yellow rectangle.

Photo 10—This is a portion of the area within the yellow rectangle shown in the previous photo. The trees burned from the burning homes. The homes ignited from the low intensity surface fire and adjacent burning homes.