

# Wildland Urban Interface Firefighting for the Structural Company Officer

WUIFSCO-Student Manual

*2nd Edition, 2nd Printing-March 2014*



**FEMA**

FEMA/USFA/NFA  
WUFSO-SM  
March 2014  
2nd Edition, 2nd Printing

*Wildland Urban Interface Firefighting for the  
Structural Company Officer*



**FEMA**

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## **ACKNOWLEDGMENTS**

The development of any National Fire Academy (NFA) course is a complex process aimed at providing students with the best possible learning opportunity we can deliver.

There are many players in course development, each of whom plays an equally important part in its success. We want to acknowledge their participation and contribution to this effort and extend our heartfelt thanks for making this quality product.

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### **COURSE GOAL**

As a responder to a Wildland Urban Interface (WUI) incident, the structural Company Officer (CO) may be placed in one of many different roles, such as initial Incident Commander (IC), Operations Section Chief (OSC), Engine Boss or Strike Team Leader/Task Force Leader, or other roles in support of the incident. This course identifies the operational activities and safety considerations for the structural CO assigned to a WUI incident. This course assumes that the student has a basic knowledge of wildland firefighting, and reinforces and expands that knowledge to include the WUI. Topics include the history of WUI incidents, the intricacies of the WUI, the interface environment, fire behavior, command issues, safety, and the related strategic and tactical options that compare and contrast with structural firefighting.

### **AUDIENCE, SCOPE AND COURSE PURPOSE**

The target audience for the “Wildland Urban Interface Firefighting for the Structural Company Officer” (WUIFSCO) course is structural COs or Chief Officers who may be in command of a single resource, Strike Team or Task Force at the scene of a WUI incident. This course may also be appropriate for those structural firefighters participating under the command of a structural CO during a WUI incident.

There were no student prerequisites identified for this course; however, the following were identified as course recommendations:

Background knowledge of the Incident Command System (ICS):

- “ICS-100: Introduction to ICS for Operational First Responders” (Q0462).
- “ICS-200: Basic NIMS ICS for Operational First Responders” (Q0463).

Students may not want to attend the F0610 course if they have already attended:

- “S-130 — Wildland Firefighter Training” (Q0901).
- “S-190 — Introduction to Wildland Fire Behavior” (Q0900).

The scope of this course is to identify the various operational activities and safety considerations for the structural CO assigned to a WUI incident.

The purpose of this course is to provide students with the ability to identify the WUI environment, contrast it with structural firefighting, and implement appropriate operational and command activities for this environment.

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**SCHEDULE**

<b>TIME</b>	<b>DAY 1</b>	<b>DAY 2</b>
8:00-9:00	Introduction, Welcome and Administrative	Unit 3: Command and Control Issues of the Wildland Urban Interface (cont'd)
9:00-9:10	<i>Break</i>	<i>Break</i>
9:10-10:20	Unit 1: Wildland Urban Interface Environment	Unit 3: Command and Control Issues of the Wildland Urban Interface (cont'd)  Activity 3.1: Initial Attack Command
10:20-10:30	<i>Break</i>	<i>Break</i>
10:30-12:00	Unit 1: Wildland Urban Interface Environment (cont'd)  Activity 1.1: Experiences with Wildland and Wildland Urban Interface Incidents  Unit 2: Wildland Fire Behavior	Unit 4: Safety  Activity 4.1: The 18 Watch Out Situations
12:00-1:00	<i>Lunch Break</i>	<i>Lunch Break</i>
1:00-2:15	Unit 2: Wildland Fire Behavior (cont'd)	Unit 4: Safety (cont'd)  Unit 5: Strategic and Tactical Operations  Activity 5.1: Evacuation and Rescue
2:15-2:30	<i>Break</i>	<i>Break</i>
2:30-5:00	Unit 2: Wildland Fire Behavior (cont'd)  Unit 3: Command and Control Issues of the Wildland Urban Interface	Unit 5: Strategic and Tactical Operations (cont'd)  Activity 5.2: Water Supplies  Unit 5: Strategic and Tactical Operations (cont'd)

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# FIREFIGHTER CODE OF ETHICS

## Background

The Fire Service is a noble calling, one which is founded on mutual respect and trust between firefighters and the citizens they serve. To ensure the continuing integrity of the Fire Service, the highest standards of ethical conduct must be maintained at all times.

Developed in response to the publication of the Fire Service Reputation Management White Paper, the purpose of this National Firefighter Code of Ethics is to establish criteria that encourages fire service personnel to promote a culture of ethical integrity and high standards of professionalism in our field. The broad scope of this recommended Code of Ethics is intended to mitigate and negate situations that may result in embarrassment and waning of public support for what has historically been a highly respected profession.

Ethics comes from the Greek word ethos, meaning character. Character is not necessarily defined by how a person behaves when conditions are optimal and life is good. It is easy to take the high road when the path is paved and obstacles are few or non-existent. Character is also defined by decisions made under pressure, when no one is looking, when the road contains land mines, and the way is obscured. As members of the Fire Service, we share a responsibility to project an ethical character of professionalism, integrity, compassion, loyalty and honesty in all that we do, all of the time.

We need to accept this ethics challenge and be truly willing to maintain a culture that is consistent with the expectations outlined in this document. By doing so, we can create a legacy that validates and sustains the distinguished Fire Service institution, and at the same time ensure that we leave the Fire Service in better condition than when we arrived.



# FIREFIGHTER CODE OF ETHICS

**I understand that I have the responsibility to conduct myself in a manner that reflects proper ethical behavior and integrity. In so doing, I will help foster a continuing positive public perception of the fire service. Therefore, I pledge the following...**

- Always conduct myself, on and off duty, in a manner that reflects positively on myself, my department and the fire service in general.
- Accept responsibility for my actions and for the consequences of my actions.
- Support the concept of fairness and the value of diverse thoughts and opinions.
- Avoid situations that would adversely affect the credibility or public perception of the fire service profession.
- Be truthful and honest at all times and report instances of cheating or other dishonest acts that compromise the integrity of the fire service.
- Conduct my personal affairs in a manner that does not improperly influence the performance of my duties, or bring discredit to my organization.
- Be respectful and conscious of each member's safety and welfare.
- Recognize that I serve in a position of public trust that requires stewardship in the honest and efficient use of publicly owned resources, including uniforms, facilities, vehicles and equipment and that these are protected from misuse and theft.
- Exercise professionalism, competence, respect and loyalty in the performance of my duties and use information, confidential or otherwise, gained by virtue of my position, only to benefit those I am entrusted to serve.
- Avoid financial investments, outside employment, outside business interests or activities that conflict with or are enhanced by my official position or have the potential to create the perception of impropriety.
- Never propose or accept personal rewards, special privileges, benefits, advancement, honors or gifts that may create a conflict of interest, or the appearance thereof.
- Never engage in activities involving alcohol or other substance use or abuse that can impair my mental state or the performance of my duties and compromise safety.
- Never discriminate on the basis of race, religion, color, creed, age, marital status, national origin, ancestry, gender, sexual preference, medical condition or handicap.
- Never harass, intimidate or threaten fellow members of the service or the public and stop or report the actions of other firefighters who engage in such behaviors.
- Responsibly use social networking, electronic communications, or other media technology opportunities in a manner that does not discredit, dishonor or embarrass my organization, the fire service and the public. I also understand that failure to resolve or report inappropriate use of this media equates to condoning this behavior.

**Developed by the National Society of Executive Fire Officers**

**GRADING METHODOLOGY**

Each student will be assessed on the last day of class with one of two versions of the final examination. Each written evaluation will consist of 30 multiple choice questions. Students will each need to earn at least a score of 70 percent on the final examination to pass the course.

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## A Student Guide to End-of-course Evaluations

**Say What You Mean ...**

### Ten Things You Can Do to Improve the National Fire Academy

The National Fire Academy takes its course evaluations very seriously. Your comments and suggestions enable us to improve your learning experience.

Unfortunately, we often get end-of-course comments like these that are vague and, therefore, not actionable. We know you are trying to keep your answers short, but the more specific you can be, the better we can respond.



Actual quotes from student evaluations:	Examples of specific, actionable comments that would help us improve the course:
1 "Update the materials."	<ul style="list-style-type: none"> <li>The (ABC) fire video is out-of-date because of the dangerous tactics it demonstrates. The available (XYZ) video shows current practices.</li> <li>The student manual references building codes that are 12 years old.</li> </ul>
2 "We want an advanced class in (fill in the blank)."	<ul style="list-style-type: none"> <li>We would like a class that enables us to calculate energy transfer rates resulting from exposure fires.</li> <li>We would like a class that provides one-on-one workplace harassment counseling practice exercises.</li> </ul>
3 "More activities."	<ul style="list-style-type: none"> <li>An activity where students can physically measure the area of sprinkler coverage would improve understanding of the concept.</li> <li>Not all students were able to fill all ICS positions in the exercises. Add more exercises so all students can participate.</li> </ul>
4 "A longer course."	<ul style="list-style-type: none"> <li>The class should be increased by one hour per day to enable all students to participate in exercises.</li> <li>The class should be increased by two days so that all group presentations can be peer evaluated and have written abstracts.</li> </ul>
5 "Readable plans."	<ul style="list-style-type: none"> <li>The plans should be enlarged to 11 by 17 and provided with an accurate scale.</li> <li>My plan set was blurry, which caused the dotted lines to be interpreted as solid lines.</li> </ul>
6 "Better student guide organization," "manual did not coincide with slides."	<ul style="list-style-type: none"> <li>The slide sequence in Unit 4 did not align with the content in the student manual from slides 4-16 through 4-21.</li> <li>The instructor added slides in Unit 4 that were not in my student manual.</li> </ul>
7 "Dry in spots."	<ul style="list-style-type: none"> <li>The instructor/activity should have used student group activities rather than lecture to explain Maslow's Hierarchy.</li> <li>Create a pre-course reading on symbiotic personal relationships rather than trying to lecture on them in class.</li> </ul>
8 "More visual aids."	<ul style="list-style-type: none"> <li>The text description of V-patterns did not provide three-dimensional views. More photographs or drawings would help me imagine the pattern.</li> <li>There was a video clip on NBC News (date) that summarized the topic very well.</li> </ul>
9 "Re-evaluate pre-course assignments."	<ul style="list-style-type: none"> <li>The pre-course assignments were not discussed or referenced in class. Either connect them to the course content or delete them.</li> <li>The pre-course assignments on ICS could be reduced to a one-page job aid rather than a 25-page reading.</li> </ul>
10 "A better understanding of NIMS."	<ul style="list-style-type: none"> <li>The instructor did not explain the connection between NIMS and ICS.</li> <li>The student manual needs an illustrated guide to NIMS.</li> </ul>

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# **UNIT 1: WILDLAND URBAN INTERFACE ENVIRONMENT**

## **TERMINAL OBJECTIVE**

*The students will be able to:*

- 1.1 *Evaluate the Wildland Urban Interface (WUI) environment and how it affects their assignment in a WUI incident in accordance with standards.*

## **ENABLING OBJECTIVES**

*The students will be able to:*

- 1.1 *Describe the complex situations and considerations in the wildland fire environment.*
  - 1.2 *Anticipate communications considerations, complex logistical issues and equipment considerations.*
  - 1.3 *Recognize the different viewpoints of various agencies regarding WUI incidents.*
  - 1.4 *Describe national standards that have an impact on WUI incidents.*
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# UNIT 1: WILDLAND URBAN INTERFACE ENVIRONMENT

Slide 1-1

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## ENABLING OBJECTIVES

- Describe the complex situations and considerations in the wildland fire environment.
- Anticipate communications considerations, complex logistical issues and equipment considerations.

Slide 1-2

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## ENABLING OBJECTIVES (cont'd)

- Recognize the different viewpoints of various agencies regarding Wildland Urban Interface (WUI) incidents.
- Describe national standards that have an impact on WUI incidents.

Slide 1-3

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**I. WILDLAND FIRE ENVIRONMENT AND CHARACTERISTICS**

**WUI DEFINITION**

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- The line, area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.
- A WUI fire is really a wildland fire that burns into or around an urban environment.
- Annual increase of interface nationwide.

Slide 1-4

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- A. Wildland Urban Interface (WUI) definition.
  - 1. The WUI is the line, area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.
  - 2. A WUI fire is really a wildland fire that burns into an urban location.
  
- B. Every year, there is a greater amount of urban interface acreage as a result of an increasing number of homes built in forests and the wildland.
  - 1. Large forest fires have increased in both size and frequency during the past 40 years.
    - a. Global warming, fuel buildup, hotter and drier weather, and increased winds may have contributed to the increase in forest fires.
    - b. The increase in forest fires may be a result of a decrease in wildland firefighters and an increase in fires caused by humans.
  - 2. The increase of wildland fire activity in the WUI environment causes more losses and threatens more lives and homes.

DVD PRESENTATION

“FIREFIGHTER SAFETY SERIES:  
STRUCTURE PROTECTION  
STRATEGIES IN THE WUI”



Slide 1-5

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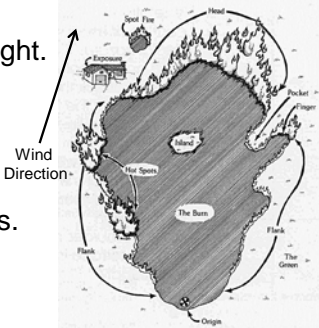
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WILDLAND FIRE ELEMENTS

- Origin — fire start.
- Flanks — left and right.
- Head.
- Hot spots.
- Spot fires.
- Islands.
- Fingers and pockets.
- Exposures.



Slide 1-6

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- C. A wildland fire consists of various elements.
1. Origin is where a fire starts and begins to burn and expand.
  2. Flanks are the left and right sides of the fire’s edge. This is usually designated as Divisions for organizational supervision and identification, beginning with Division A from the left of the origin and Division Z from the right of the origin, in the direction of spread.
  3. Head is the furthest part of the fire from the origin in the direction of greatest spread. When the fire splits in direction, there may be two heads.
  4. Spot fires are new fires igniting from embers ahead of the main fire in new vegetation.
  5. Islands are areas of unburned fuel in the middle of the main fire with burned areas surrounding around them.

6. Fingers and pockets are areas where fire fingers out, creating pockets of unburned fuel and fingers of fire off to the sides or flanks of the main fire area.
7. Exposures are any vegetation, building or other combustible items directly threatened by the fire.

**WUI FIRE ENVIRONMENTS**

- WUI incidents include various arrangements of fuels and structures in varying environments.
- Different environments will influence different strategies and tactics that firefighting may employ.
- Can affect the number and type of resources needed.

Slide 1-7

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D. WUI fire environments.

1. WUI incidents can include various arrangements of fuel and structures in varying environments.
2. These different environments will influence the many different strategies and tactics that WUI firefighters can employ.
3. These differing environments may affect the number and type of resources needed.

**WILDLAND FUELS**

- Fuel definitions are subjective and vary around the country.
- Light fuels — grass, leaves and duff.
- Medium fuels — brush and small trees.
- Heavy fuels — large trees, logs, stumps and slash.

Slide 1-8

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E. Wildland fuels.

1. The definitions for light, medium and heavy fuels are subjective and vary around the country.
2. Generally, light fuels are grass and leaves.
3. Medium fuels are brush and small trees.
4. Heavy fuels are large trees, logs, stumps and timber slash.

**FUEL DENSITY**

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- Density is classified into low, medium and high.
- Usually expressed in tons per acre.
  - Light fuels: one to five tons per acre.
  - Medium fuels: 20 to 40 tons per acre.
  - Heavy slash fuels: 30 to 200 tons per acre.
  - Heavy timber fuels: 100 to 600 tons per acre.

Slide 1-9

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F. Fuel density.

1. The density of the fuel is very important; there can be low, medium and high density to light, medium and heavy fuel.
2. Fuel density is usually expressed in tons per acre.
  - a. Light fuels are one to five tons per acre.
  - b. Medium fuels are between 20 to 40 tons per acre.
  - c. Heavy slash fuels are from 30 to 200 tons per acre.
  - d. Heavy timber fuels are 100 to 600 tons per acre.

### MIXING STRUCTURES AND FUELS

- More complicated terrain, fuels, home locations and access.
- Make operations complicated and more dangerous.



Slide 1-10

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G. WUI incidents mix structures and fuels.

1. WUI incidents are more complicated than normal structure fires due to the terrain, fuels, home locations and access.
2. These incidents make firefighting operations more complicated and dangerous for firefighters.

### ISOLATED STRUCTURE CHARACTERISTICS

- Narrow, unpaved roadways.
- Difficult to locate occupancies/address.
- Abundance of vegetation and combustible buildings.



Slide 1-11

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H. WUI isolated structure characteristics.

1. Isolated structures may have narrow and unpaved roadways.
2. It is usually difficult to locate the residents and the address.
3. There is usually an abundance of vegetation and combustible buildings.
4. Isolated structures in heavy fuels are the hardest to defend and the most unsafe situation to be in for the homeowner and firefighters.

5. Sites, similar to the one depicted, require clearing and thinning of the surrounding vegetation so that firefighters and engines, parked between the structure and the vegetation, can withstand any radiant heat produced by wind-driven fires. If there is not enough clearing, then firefighters cannot safely remain at this structure to protect it.

**ISOLATED STRUCTURE CHARACTERISTICS (cont'd)**

- Considerations.
  - Slope.
  - Aspect.
  - Access.
  - Escape routes.
  - Safety zones.
- Survivable or deathtrap.



Slide 1-12

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6. Consider the slope, aspect, access, escape routes and safety zones.
7. During most of the year, when burning conditions are not severe, the home in the photograph can be defended easily against smoldering ground fires.
8. This site could be a deathtrap for both homeowners and firefighters during the right conditions, where the fuels are very dry, the winds are high, and the fire is crowning in this fuel type.

**GROUPED AND ISOLATED STRUCTURES IN WILDLAND**

- Similar characteristics as previous.
- More buildings to protect.
- Increased decisions needed.
- Additional resources needed.



Slide 1-13

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- I. Characteristics of grouped and isolated structures in the wildland.
  1. These structures are similar to the characteristics of isolated structures.

2. Many more buildings need to be protected.
3. There are increased decisions being made.
4. This situation will require additional resources to protect additional buildings.

**WUI RURAL COMMUNITIES MIXING  
STRUCTURES AND FUEL**

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- Complex terrain.
- Lots of fuel.
- Complex topography.
- Complex access.
- Citizens evacuating.
- Escape routes.
- Safety zones.

Slide 1-14

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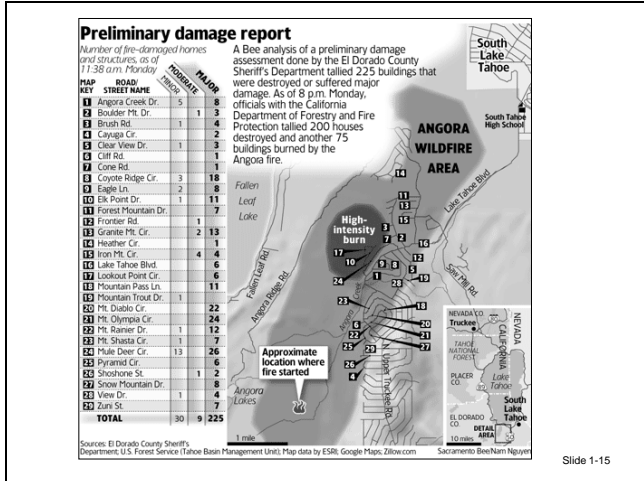
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- J. Characteristics of WUI rural communities and mixing structures with fuel.
  1. Terrain is more complex throughout the larger area.
  2. The topography is more complex throughout the larger area.
  3. There are complex access issues throughout the area.
  4. Many citizens may need to be evacuated.
  5. There are more potential escape routes.
  6. There are more potential safety zones.

# WILDLAND URBAN INTERFACE ENVIRONMENT



Slide 1-15



Slide 1-16




Slide 1-17

K. WUI threat to an urban city environment.

1. The slide demonstrates a 9,500 acre fire in rough terrain threatening the city of Santa Barbara, California, as the large fire front approaches numerous residential neighborhoods simultaneously.
2. Considerable air and ground resources will be needed, along with the significant Incident Command System (ICS) organizational overhead positions required to supervise all the needed resources. Significant logistical support will be required for this large fire organization.

**CONCENTRATED STRUCTURES  
AND ISOLATED FUELS**

- Easy access.
- Good water.
- Resource intense.
- Minimum fire behavior.
- Significant loss potential.



Slide 1-18

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- L. WUI fires with concentrated structures and isolated fuels.
1. Within urban areas there are concentrated structures mixed with isolated areas of vegetation. Easy access is usually found to the vegetation and structures.
  2. There is usually good water supply found in these areas.
  3. These types of incidents pose significant resource needs to defend numerous structures.
  4. There may be minimal fire behavior and wildland fire spread.
  5. However, the potential for significant structural loss is high due to quick exposure from the fire.

DVD PRESENTATION

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“FIRST NINE MINUTES  
OF WUI FIRE”



Slide 1-19

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RESIDENTS AND THE PUBLIC

- Fear/Panic/Apprehension.
- Unsure what to do/where to go.
- Unsafe clothing.
- Require direction.
- Help/Hinder.
- Drains resources.
- Evacuation.



Slide 1-20

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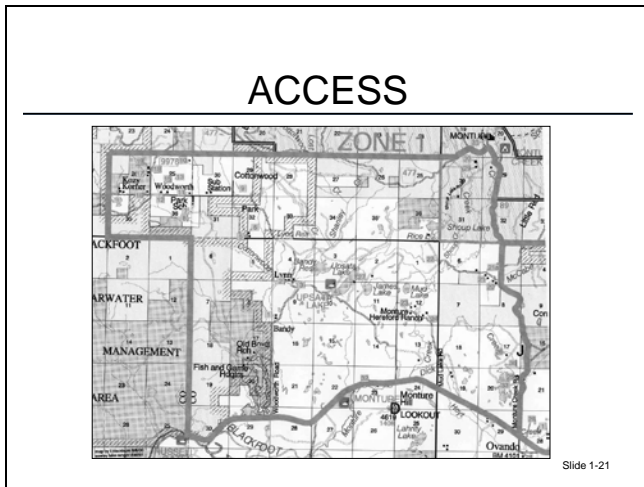
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M. WUI complexities.

1. Residents and the public is one of the many complexities in a WUI environment.
  - a. Residents and public in the area of a WUI fire will experience fear, panic and apprehension.
  - b. They will usually not know what to do, where to go, or what to take with them.
  - c. They will most likely be wearing unsafe clothing for the conditions, with hot embers blowing, etc.
  - d. They will require direction from law enforcement or fire personnel.
  - e. You may find them helpful to you or a hindrance to your operation.

- f. Either way, they will be a drain on resources to provide direction and get the evacuation started, if desired. However, if evacuating them, know where to send them first.
- g. This situation creates a roller coaster of emotions for first responders, not knowing whether to deal with fire or civilians and their animals.



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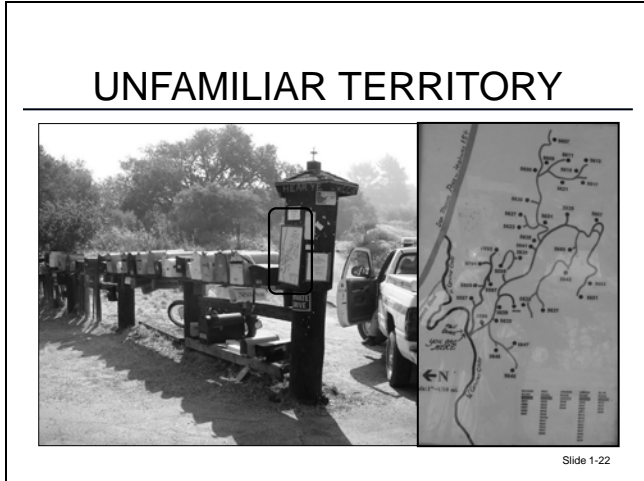
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- 2. Access is another WUI complexity.
  - a. Most first responders know their first-in areas well; however, mutual aid resources may need assistance.
  - b. Obtain good maps and intelligence first.
  - c. Scout the area for best access and safety concerns for resources before committing.
  - d. Consider widths and, for larger resources, the weight limits of bridges.
  - e. Consider dead ends, escape routes and safety zones.



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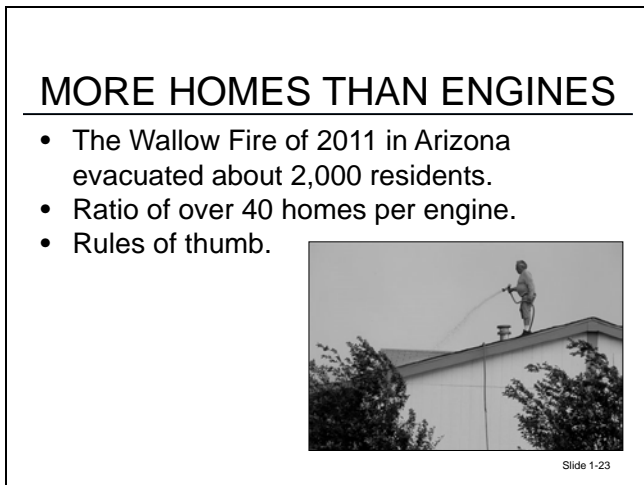
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3. Many firefighters find themselves in unfamiliar territory.
  - a. Consider the terrain, midslope roads, steepness for apparatus and personnel.
  - b. Consider the road and bridge widths and their condition and visibility.
  - c. Take note of the numbers of residences or buildings in the area (mailboxes), addresses, and road names.
  - d. Use special area mapping indicators to show the above considerations.



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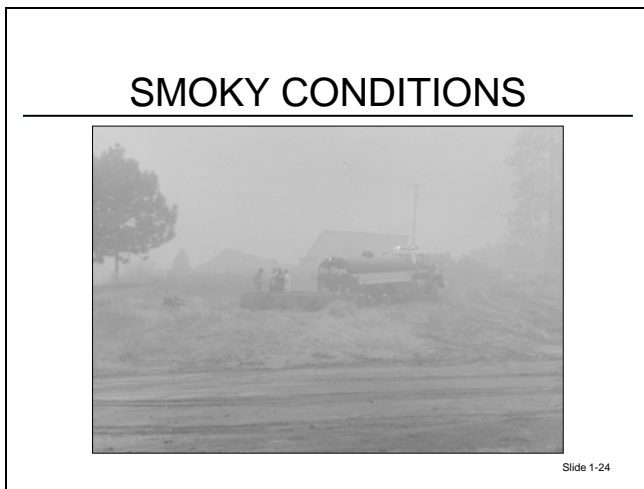
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4. Having more homes than engines is another complexity in a WUI incident.
  - a. The Wallow Fire of 2011 in Arizona evacuated about 2,000 residents.

- b. This is a ratio of more than 40 homes to one engine.
- c. On more than one occasion, there are more homes than resources available to assign one resource per home. Some rules of thumb can help in this situation.
  - Assign one engine for every one to two homes in the perimeter.
  - Assign one Strike Team to float inside the perimeter for 20 to 30 homes, or two Strike Teams for over 30 homes inside the perimeter.



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- 5. Smoky conditions create a more complex situation during a WUI.
  - a. Extensive periods of smoke might mean that the fire is not burning actively.
  - b. These kinds of situations are hard on firefighters and their respiratory systems.
  - c. When combined with long, hard shifts and dust, firefighter fatigue and health can become a major concern.



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- 6. WUI night operations are even more complex.
  - a. The combination of smoke, dust and darkness makes conditions miserable and unsafe.
  - b. Extra safety precautions must be taken to ensure that personnel operate safely.



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- 7. WUI incidents are complex due to the dynamic fire behavior.
  - a. Witnessing extreme, heavier wildfire may be a new experience for some structural firefighters.
  - b. Extra precautions must be taken. Consider leaving the area or retreating to safety zones when conditions become too severe.

### YOUR ASSIGNMENT

- Possible roles that a Company Officer (CO) may play at a WUI incident may vary.
- Your response may be local, regional, statewide, or even out of state.

Slide 1-27

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8. Firefighter’s assignments.

- a. The possible roles that a Company Officer (CO) may play in a WUI incident may vary.
- b. The response may be local, regional, statewide, or even out of state.

## II. INFRASTRUCTURE ISSUES

### INFRASTRUCTURE ISSUES

- Infrastructure typically refers to the facilities that support and are essential to the community.
  - Roads.
  - Bridges.
  - Water and sewer systems.
  - Electrical power systems.
  - Telecommunications.

Slide 1-28

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- A. Infrastructure typically refers to the facilities that support and are essential to the community, such as roads, bridges, water and sewer systems, electrical power systems, and telecommunications.

**ROADS**

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Slide 1-29

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- B. Some roads are not suited for all types of resources.
  - 1. Consider the surface material.
  - 2. Evaluate the roughness.
  - 3. Consider width and turn around capability.
  - 4. Consider the steepness/slope alignment.
  - 5. Consider parking availability offside.
  - 6. Evaluate the access in and out.

**BRIDGES**

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- Considerations.
  - Combustibility.
  - Width.
  - Weight limitations.
  - Angles of entering and exiting.



Slide 1-30

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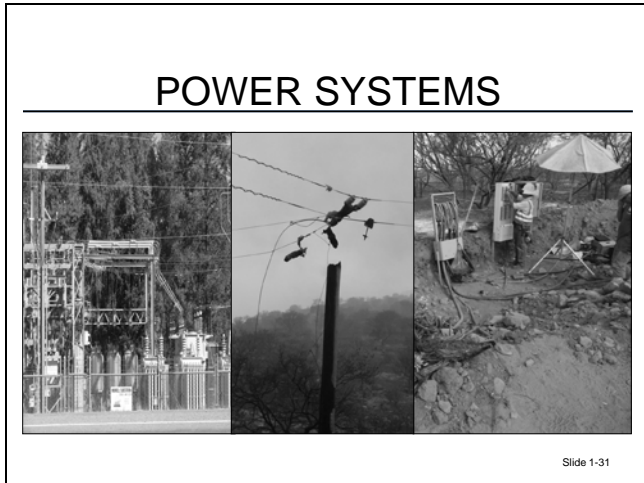
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- C. Bridge considerations should include the combustibility, width, weight limitations, and angles of entering and exiting. If the bridge is covered, evaluate the height.



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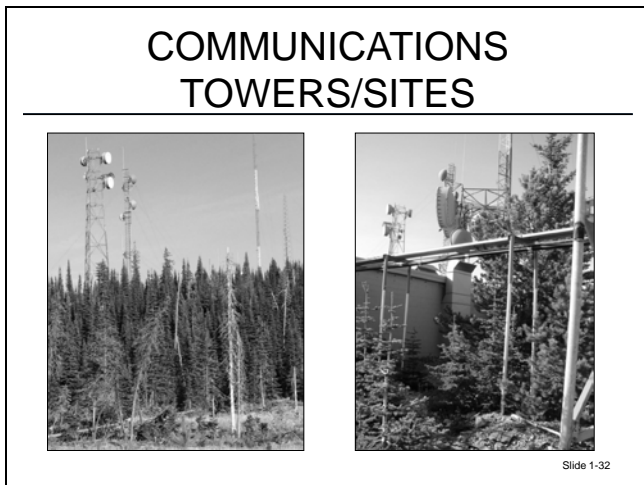
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- D. Electrical power systems.
1. Consider the electrical shock potential.
  2. Clear or extinguish brush surrounding facilities.
  3. Consider what it powers in case it should short out.
    - a. Water pumps.
    - b. Communications systems.
    - c. Command Post (CP) or incident base.



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- E. Communications sites.
1. Consider electrical shock potential.

2. Clear or extinguish brush surrounding facilities.
3. Consider what it provides and whether or not it should go down.
  - a. Telephones/Cellphones.
  - b. Radio systems.
  - c. Television.
  - d. Internet.
  - e. CP or incident base.

### III. COMPLEX LOGISTICAL ISSUES

**COMPLEX LOGISTICAL ISSUES**

- Operations as needed 24/7.
  - Operational periods can be 12, 16 or 24 hours.
- Long periods of waiting interspersed with periods of intense activity.
- Expanded Incident Command System (ICS) organization.
- Written, formal Incident Action Plan (IAP).
- Public evacuation and sheltering.

Slide 1-33

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- A. Long-duration WUI incidents create many varied logistical issues.
  1. Operations as needed 24/7. The 12, 16 or 24 hour operational periods are based on fire conditions, environment and resource availability.
  2. Long periods of waiting interspersed with periods of intense activity on the line.
  3. Greatly expanded ICS organization to manage the incident and numbers of resources.
  4. A written Incident Action Plan (IAP) will need to be developed.
  5. Public evacuation and sheltering needs to be expanded to handle multiple days.

### LOGISTICAL SUPPORT

- Incident Base, camps, spikes may be established to provide:
  - Feeding.
  - Showers/Sanitation.
  - Sleeping.
  - Fueling.
  - Supplies.
  - Equipment.
  - Repairs.



Slide 1-34

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B. Incident Base, camps and spikes may need to be established to provide feeding for personnel assigned, showers or sanitation facilities, sleeping facilities, fueling facilities, supply caches, equipment caches, and repair and maintenance for equipment and apparatus.

### PERSONAL SUPPORT

- Toiletries and medications.
- Cash and credit cards.
- Extra clothing.
- Extra food and water.
- Tent, cot or sleeping bag.
- Officer support kit.
  - Forms, time and equipment tracking, and incident organization aids.

Slide 1-35

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C. Due to long-duration assignments and the possibility for multiple-day assignments to WUI incidents, all personnel should be prepared with personal support items.

1. Make sure to take toiletries and medications.
2. Remember to take cash and credit cards.
3. Pack extra clothing.
4. Bring extra food and water.
5. Take along a tent, cot or sleeping bag.

6. Bring an officer support kit consisting of forms, time and equipment tracking, and incident organization aids.

**PERSONAL PROTECTIVE EQUIPMENT**

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Structural PPE	Wildland PPE
	

Slide 1-36

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- D. Both structural and wildland personal protective equipment (PPE) is appropriate on WUI fires.
  1. For structural protection, full turnout gear for interior structural firefighting is appropriate; however, full turnout gear is not suited for wildland fire operations because it is far too heavy and cumbersome, which will cause firefighter fatigue.
  2. Wildland PPE is much more appropriate for the long-duration assignments dealing with just the vegetation fire. It is lighter in weight, but it also includes fire shelter, canteen or water bottle holders, and radio harness.

**HAND TOOLS**

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<ul style="list-style-type: none"><li>• Shovel.</li><li>• Pulaski.</li><li>• McCloud.</li><li>• Swatter.</li><li>• Fire rake.</li><li>• Chainsaw.</li><li>• Drip torch.</li><li>• Fusee.</li><li>• Back pump.</li></ul>	
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Slide 1-37

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- E. Wildland hand tools.

1. Equipment used by wildland firefighters where water and engines are not a viable option includes many hand tools for building handline, catching small spot fires, and mopping up.
2. Examples of such hand tools include a shovel, Pulaski, McCloud, swatter, fire rake, chainsaw, drip torch, fusee and back pump.
3. Knowing how to use these tools effectively will enhance your options to accomplish wildland fire control operations.

**MECHANIZED EQUIPMENT**

- Dozers.
- Plows.
- Graders.
- Masticators.
- Excavators.



Slide 1-38

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F. Mechanized equipment.

1. Heavy equipment, such as dozers, plows, graders, masticators (grinds into pulp), and excavators may be used in wildland fire operations to assist in primary and secondary fire line construction. These lines may also be used to backfire from in some circumstances.
2. When operating in close proximity to heavy equipment, personnel must use extreme caution due to the operator's inability to see or hear those on the ground near them and due to the fact that the rolling material from these units can cause injuries.

## ENGINES

- Engines are typed one through six.
- Structural, brush and patrol engines.
- Some all-wheel drive capable.



Slide 1-39

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### G. Engines.

1. Fire engines are typed one through six in ICS, from large structural engines and brush engines to patrol type engines.
2. Some have all-wheel drive capability for off-road purposes.
3. Specific engine type specifications are found in the ICS Field Operations Guide (FOG) under the Resource Types and Minimum Standards section.

## WATER TENDERS

- Water tenders are typed one through three.
- Some have all-wheel drive capability.
- Some may be tractor-trailer type vehicles.



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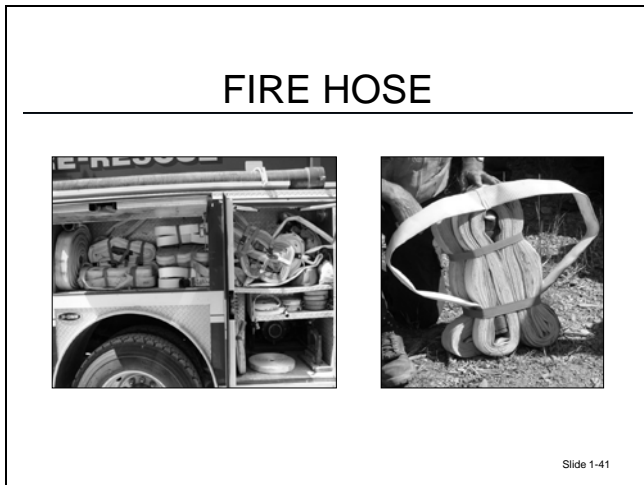
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### H. Water tenders.

1. Water tenders are typed into two categories: support and tactical water tenders.
  - a. Tactical water tenders are typed one and two.

- b. Tactical water tenders are used for filling engines, filling portable water tanks, pumpkin tanks, shuttling water, and other tactical needs on the fire line.
  - c. Support water tenders are typed one through three.
  - d. Support water tenders are used for dust abatement, road repair and other support functions, usually working in support roles to nonoperational sections or units.
- 2. Some have all-wheel drive capability for off-road use.
  - 3. Some may be tractor-trailer type vehicles.
  - 4. Specific water tender type specifications are found in the ICS FOG under the Resource Types and Minimum Standards section.



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- I. Fire hose.
  - 1. For most wildland fires, lightweight, smaller diameter hose is used.
  - 2. They are typically from rolls or bundles and are carried manually on the personnel's back, then deployed in a progressive hoselay process, moving quickly along the perimeter of the fire line.

## PORTABLE PUMPS — LONG HOSELAYS



Slide 1-42

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### J. Portable pumps.

1. In the wildland, hoses may be very long. Portable pumps may be used from stationary water sources to supply water to hoses. Sumps and portable tanks may be used and filled by portable pumps, engines, water tenders or helicopters.
2. Both structural and wildland firefighters use water for fighting fire, but often in much different ways and sometimes with different objectives and accessories (i.e., adapters, nozzles, sprinklers, etc.) for structure protection, fire control and other uses.

## FOAMS AND GELS



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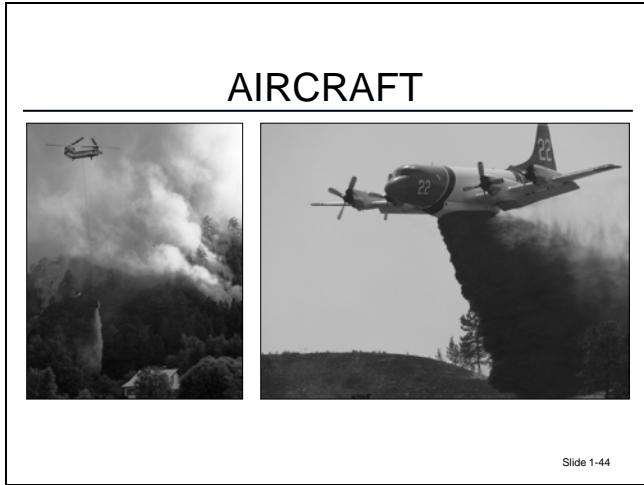
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### K. Foams and gels.

1. Adding foam or gel to water delivery can make structure defense more effective by increasing the amount of heat absorption or enhancing thermal protection of structures.

- 2. Foams and gels also work more efficiently than only using water in fire suppression efforts.



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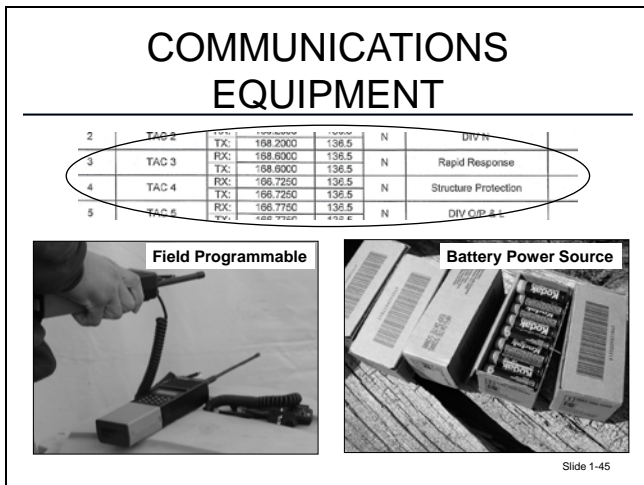
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L. Aircraft.

- 1. Helicopters can very accurately drop water and sometimes retardant to substantially reduce fire intensity through concentrated or trailing drops.
- 2. Retardant-dropping aircraft will lay a “line” of retardant that also reduces fire intensity for ground crews to be able to move in and control the fire. Fire-retardant lines will always need ground crews to follow up to completely extinguish and mop up the fire line.
- 3. Personnel must always use caution when operating in areas where aircraft are operating, as aircraft may cause changes in fire behavior due to wind currents from the aircraft.



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M. Communications equipment.

1. Due to numerous personnel and agencies involved in large WUI incidents, hand-held programmable radios are commonly used with many different frequencies for different purposes and locations on the incident.
2. Personnel must be well-versed in the use of these radios, know how and where to get them programmed correctly, and ensure that they understand the assigned frequencies from the Communications Plan found in the IAP.
3. Sufficient batteries must be carried to ensure continuous use on long-duration incidents.

**IV. MAPS AND NAVIGATIONAL AIDS**

**MAPS AND NAVIGATIONAL AIDS**

- A variety of map products are used.
  - Topographic maps.
  - Street maps.
  - Satellite maps.
  - Infrared maps
  - Special area maps.
  - IAP maps.
- ICS map symbology is found in ICS Field Operations Guide (FOG).

Slide 1-46

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A. In the WUI environment, a variety of map products are used for different purposes. Topographic maps, street maps, satellite maps and special area maps are some examples.

**MAPS AND NAVIGATIONAL AIDS  
(cont'd)**

- Other navigational aids and technology is used.
  - Mobile and hand-held GPS devices.
  - Computers, laptops and notepads.
  - Weather forecasting programs.
  - Fire behavior prediction programs.

Slide 1-47

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- B. In the WUI incident environment, other navigational aids and technology is used, such as mobile and hand-held GPS devices, computers, laptops, notepads, and various weather forecasting and fire behavior prediction software products.

V. WILDLAND URBAN INTERFACE TRAINING AND STANDARDS

**WUI TRAINING AND STANDARDS**

- National Wildfire Coordinating Group (NWCG).
- National Fire Protection Association (NFPA).
- National Fire Academy (NFA).



Slide 1-48

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- A. The training standards and qualifications for wildland firefighters are set by the National Wildfire Coordinating Group (NWCG).
- B. National standards for structural firefighter training come from the National Fire Protection Association (NFPA), while many of the training courses come from the National Fire Academy (NFA).

**NATIONAL COHESIVE STRATEGY MISSION SIMILARITIES**

- Restoring and maintaining resilient landscapes.
- Creating fire-adapted communities.
- Responding together to wildfires.



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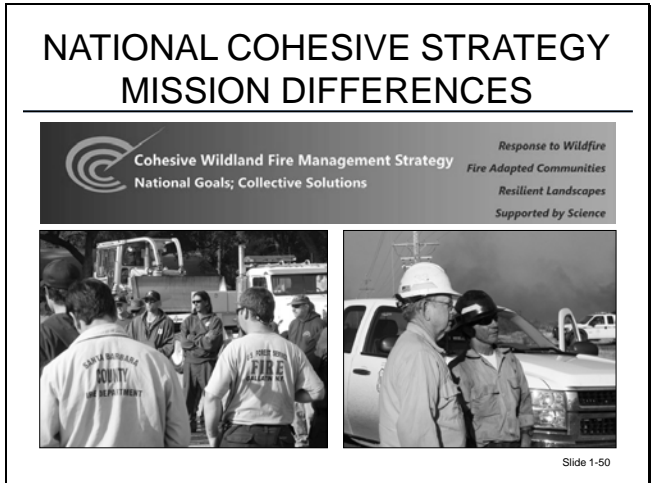
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- C. The National Cohesive Strategy (authored by the Wildland Fire Leadership Council).
  - 1. Mission similarities.

- a. Addressing wildfire is not simply a fire management, fire operations or WUI problem. It is a larger, more complex land management and societal issue.
- b. The vision for the next century is to safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and as a nation, live with wildland fire.
- c. Three primary factors have been identified as presenting the greatest challenges and the greatest opportunities for making a positive difference in addressing the wildland fire problems to achieve this vision.
  - Restoring and maintaining resilient landscapes.
    - The strategy must recognize the current lack of ecosystem health and variability of this issue from geographic area to geographic area.
    - Landscape conditions and needs vary depending on local climate and fuel conditions, among other elements; the strategy will address landscapes on a regional and subregional scale.
  - Creating fire-adapted communities.
    - The strategy will offer options and opportunities to engage communities and work with them to become more resistant to wildfire threats.
  - Responding to wildfires.
    - This element considers the full spectrum of fire management activities and recognizes the differences in missions among local, state, tribal and federal agencies.
    - The strategy offers collaboratively developed methodologies to move forward.



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- 2. Mission differences.
  - a. A local fire department’s primary mission may be focused on structures, but it often includes initial attack on wildfire ignitions within its jurisdiction.
  - b. State forestry agencies are bound to their mission of suppressing all fires threatening commercial timber and other resources.
  - c. Federal agencies have a broader mission on public land and may employ alternative fire management strategies. Federal agencies also have a special trust obligation to Native Americans on their lands and reserved rights.
  - d. An effective, cohesive strategy must guide all organizations to recognize and accept each other’s management differences and promote a more cohesive response to the wildfire management challenges across all jurisdictions.
  - e. A national cohesive strategy must recognize the differences and tensions that exist among the partners and stakeholders and why those differences exist (e.g., different priorities, planning processes, legal mandates, values and resources) and seek to resolve them.

## ACTIVITY 1.1

### Experiences with Wildland and Wildland Urban Interface Incidents

#### Purpose



To share your past experiences in wildland fires and WUI incidents with your group, then capture a list of challenges experienced and potential solutions to these challenges and prepare to share with the entire class.

#### Directions

1. You will be divided into groups of five to seven people by the instructor.
2. Share your various past experiences having responded to wildland fires and/or WUI incidents with your group, while emphasizing the challenges experienced at those incidents.
3. Each group will compile a list of challenges identified by the group and provide potential solutions for each challenge.
4. Place all challenges and solutions on the easel pad. Select a representative for the group to present the challenges and solutions. When presenting the group's findings, do not repeat any challenges that were already presented by another group.

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VI. SUMMARY



## SUMMARY

- Wildland fire environment.
- WUI characteristics.
- Infrastructure issues.
- Complex logistical issues.
- Maps and navigational aids.
- WUI firefighter training and standards.

Slide 1-52

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# APPENDIX

## WILDLAND URBAN INTERFACE HISTORY AND THE WILDLAND FIRE LEADERSHIP COUNCIL

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## Wildland Urban interface History and the Wildland Fire Leadership Council

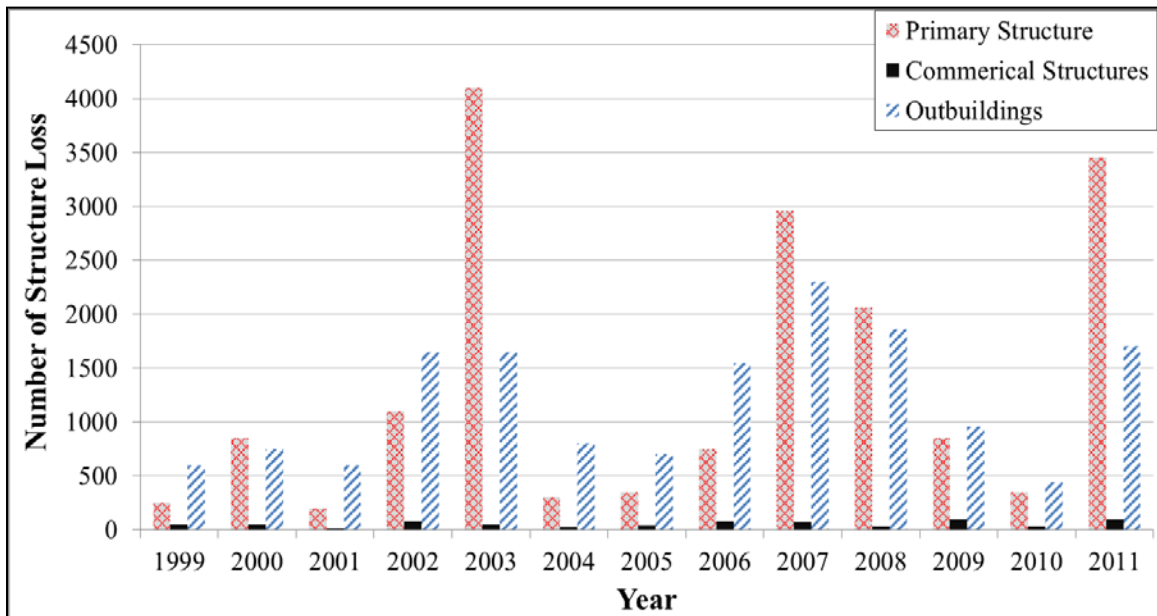
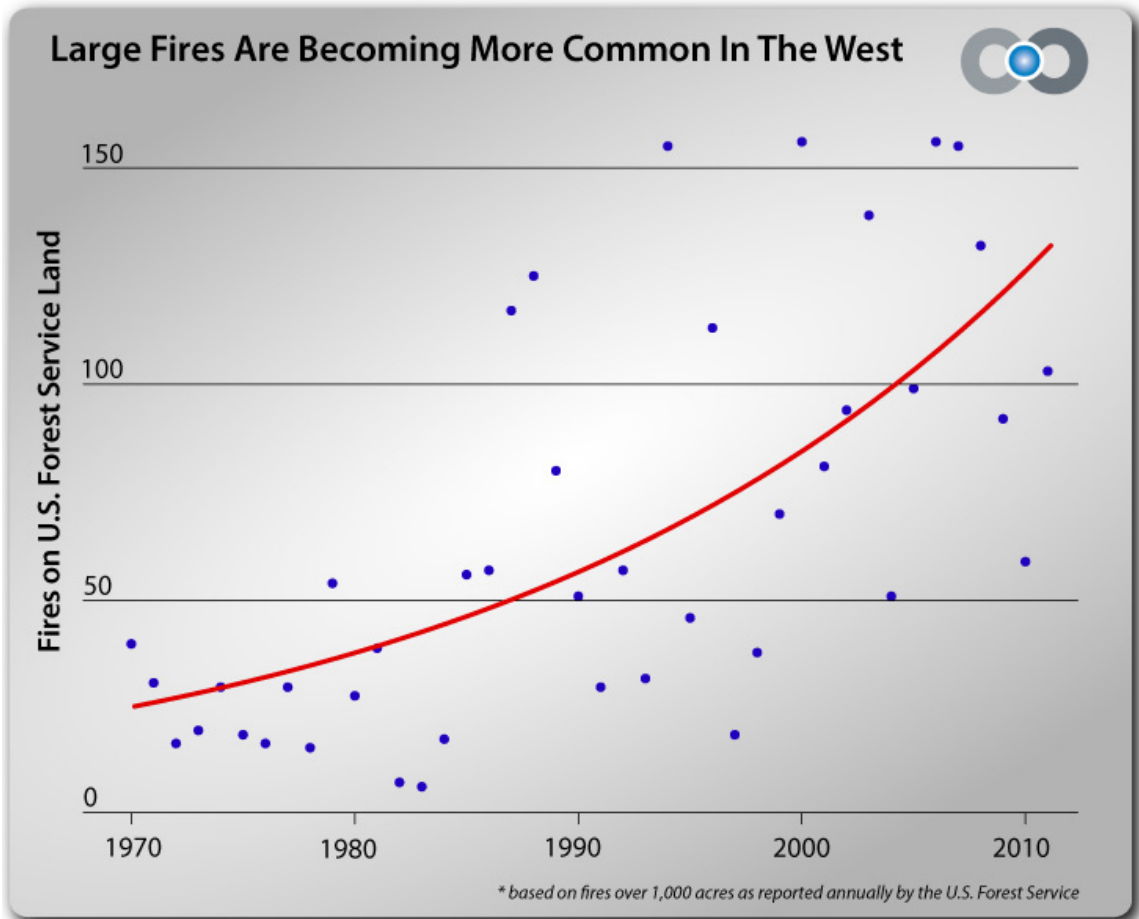
### THE WILDLAND URBAN INTERFACE FOR THIS COURSE

1. Anyone can successfully fight a vegetation fire and protect homes from a smoldering fire in wet fuels with no wind and with virtually **no** fire behavior.
2. This course features Wildland Urban Interface (WUI) firefighting operations when the conditions are the opposite and promote increased burning intensity, threatening lives, homes and neighborhoods. Examples of such conditions are the following:
  - Dry fuels.
  - Hot temperatures.
  - Low relative humidity.
  - Windy conditions.

### HISTORIC PRACTICES

1. For more than 100 years, all forest fires throughout our country have been suppressed. The result in the United States, and especially in the Western states, has created the following scenario:
  - There is heavy fuel loading due to infrequent fires.
  - Fire now burns with higher intensity.
  - There are far greater numbers of homes being built within the wildland environment, creating much more significant WUI fire problems.
2. The past evidence of historic low-intensity fires is still evident in remaining stumps.
  - The larch stumps from Montana still had evidence of 13 different low-intensity fires since the 1800s until they were cut down in 1920.
  - Not every tree in this area was involved in fire due to low-intensity fires at the time.
  - This area has not seen fire since 1920.
3. Large fires in Maine in 1947.
  - The conditions were just right for this historic wildfire event to occur in Maine.

- Currently, the existing forest fuel conditions in Maine are still similar.
  - Could history repeat itself elsewhere? Yes, it could — for instance, the incident at Hinckley, Minnesota, in 2012.
4. History repeats itself.
- If we do not learn from history, we are doomed to make the same mistakes and suffer the same tragedies.
  - Your area is not immune to these same situations.
  - Significant WUI fires are generally infrequent events. It takes a long time for a forest to regrow and contain enough fuel to pose a significant risk for intense wild fire. However, all areas are subject to these WUI fires under the right conditions and situations. Droughts and/or high wind conditions can easily become a significant WUI fire event that would overwhelm firefighters and residents.
5. WUI structure losses.
- The National Interagency Fire Center (NIFC) estimates that the average annual structure loss in the U.S. from 1999 to 2011 caused by wildfire is 2,598 structures per year, with a little more than half of these losses being primary residences. These numbers are based on information provided by the NIFC Incident Command System (ICS)-209 incident reports for large forest fires only and do not reflect actual national losses.
  - The U.S. Fire Administration (USFA) Fire Estimates, which present data based on the National Fire Incident Reporting System (NIFRS), show substantial additional structure loss, especially with smaller local wildfire events. If one were to combine these two different sources of information together, then on average, more than 4,000 structures are lost every year due to wildfires. Many more are damaged each year.
  - Additionally, the current trend indicates a significant increase in the annual number of nationwide wildland fires.



## THE WILDLAND FIRE LEADERSHIP COUNCIL

1. The Wildland Fire Leadership Council authors the National Cohesive Strategy on Wildfire. For further information, visit <http://www.forestsandrangelands.gov/strategy/index.shtml>.
2. The Wildland Fire Leadership Council consists of the following agencies:
  - Department of the Interior.
  - Department of Agriculture.
  - Forest Service.
  - National Park Service.
  - Fish and Wildlife Service.
  - Bureau of Land Management.
  - Bureau of Indian Affairs.
  - Geological Survey.
3. Department of Homeland Security (DHS)/Federal Emergency Management Agency (FEMA)/USFA. This course is a product of the National Fire Academy (NFA), which is an agency under USFA, FEMA, and DHS.
  - Western Governors' Association.
  - National Governors' Association.
  - National Association of Counties.
  - Intertribal Timber Council.
  - National League of Cities.
  - National Association of State Foresters.
  - International Association of Fire Chiefs, which represents fire departments.

## **UNIT 2: WILDLAND FIRE BEHAVIOR**

### **TERMINAL OBJECTIVE**

*The students will be able to:*



- 2.1 *Evaluate the impact of fire behavior on the safety of operations at a Wildland Urban Interface (WUI) incident.*

### **ENABLING OBJECTIVES**

*The students will be able to:*

- 2.1 *Analyze the impact of fuel considerations on WUI incidents.*
  - 2.2 *Analyze the impact of topography on WUI incidents.*
  - 2.3 *Analyze the impact of weather on WUI incidents.*
  - 2.4 *Recognize situations that indicate problem or extreme wildland fire behavior.*
  - 2.5 *Describe how wildfire ignites homes and other structures.*
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**UNIT 2:  
WILDLAND FIRE BEHAVIOR**

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**ENABLING OBJECTIVES**

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- Analyze the impact of fuel considerations on Wildland Urban Interface (WUI) incidents.
- Analyze the impact of topography on WUI incidents.
- Analyze the impact of weather on WUI incidents.

Slide 2-2

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**ENABLING OBJECTIVES**

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- Recognize situations that indicate problem or extreme wildland fire behavior.
- Describe how wildfire ignites homes and other structures.

Slide 2-3

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**I. WHY ARE FIRE BEHAVIOR AND WEATHER CONSIDERATIONS IMPORTANT FOR THE STRUCTURAL COMPANY OFFICER?**

**IMPORTANCE OF FIRE BEHAVIOR AND WEATHER CONSIDERATIONS**

- Your safety, fellow firefighters' safety, and the public's safety depend on correct interpreting of behavior.
- Correct strategy and tactics to employ in WUI firefighting are dependent on this.
- Always pay attention to fire behavior.
- Learn from past fires; review and critique current fires.

Slide 2-4

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- A. The firefighter's, their fellow firefighters', and the public's safety depend on correctly interpreting fire behavior.
- B. The correct strategy and tactics to employ in Wildland Urban Interface (WUI) firefighting are dependent on correctly interpreting fire behavior.
  - 1. Anyone can see what a fire has done.
  - 2. Most firefighters can understand what a fire is presently doing.
  - 3. However, to be safe and effective in WUI incidents, firefighters should be able to tell what a fire is going to do before it does it.
- C. Always pay attention to fire behavior.
- D. Learn from past fires; review and analyze the fire behavior on current fires.

II. FACTORS THAT AFFECT WILDLAND FIRE BEHAVIOR

**FACTORS THAT AFFECT FIRE BEHAVIOR**

- Fuel.
- Topography.
- Weather.



Slide 2-5

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- A. The three major components that determine and influence fire behavior are fuels, topography and weather.
- B. People cannot do much to influence weather or topography; the only component they can influence is fuels.

**FUELS (FINE)**

- Grass, leaves, pine needles, twigs.
  - Less than 1/4 inch in diameter.
  - Easy to ignite.
  - Burn rapidly.
  - Kindling for heavy fuels.



Slide 2-6

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- C. Fuels.
  - 1. Fine fuels.
    - a. During dry, windy conditions, most homeowners and firefighters tend to underestimate the potential fire behavior intensity in fine fuels like grass and tend to overestimate our ability to suppress such a fire with water.

- b. Fine fuels burn quickly and react very fast to changing wind conditions.
- c. Fine fuels are instrumental in fire spread rates and represent the kindling that ignites larger fuels.



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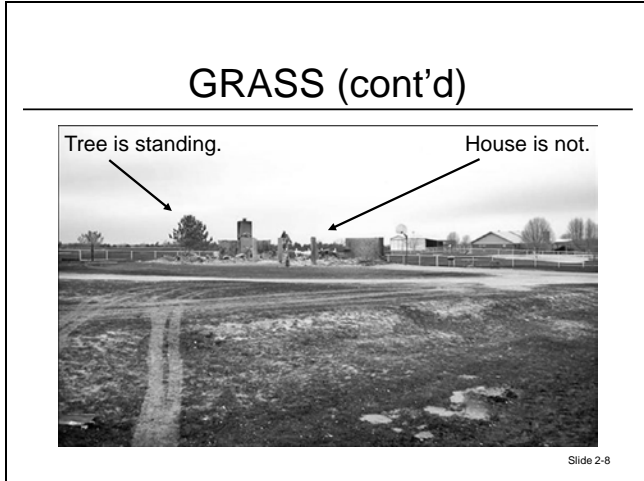
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- d. Grass.
  - There is plenty of dry grass with wind, and this will yield a fire that is impossible to catch or even keep up with. Documented “prairie” fires in the 1800s would run for hundreds of miles at times.
  - Appropriate strategies and tactics are dictated by the fire behavior experienced. What will work on slow fire-spread rates will not necessarily work on high rates of spread.
  - Staying and defending a home in light fuels can often be successful if there is enough defensible space and/or enough water used to counteract the fire intensity expected. Prewetting fine fuels is effective in reducing fire intensity.



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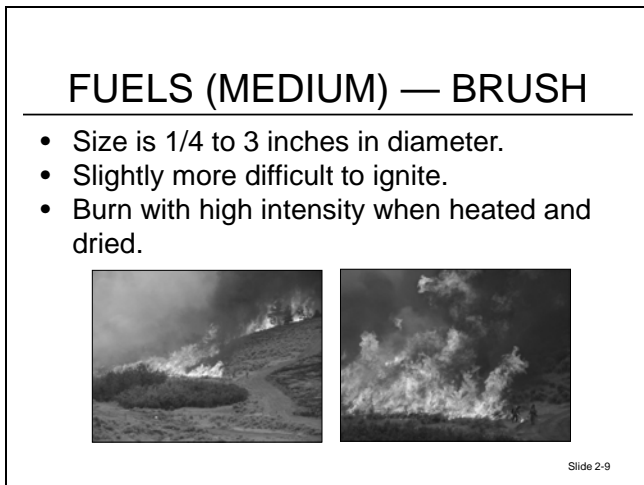
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- This photograph depicts the result of a grass fire pushed by wind. The intensity is of very short duration, thus the survival of the pine tree. There still would be a lot of embers or sparks generated — often seed heads of weeds and grass, which will ignite vulnerable points in, on, or adjacent to structures.



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2. Medium fuels — brush.
  - a. Very low fuel moisture for sagebrush will produce these flame lengths almost immediately upon ignition.
  - b. In addition to the fine fuels at the ends of the branches, almost all of the branches and stems are also being consumed and contributing to the fire intensity.

### FUELS (MEDIUM) — BRUSH (cont'd)

- Juniper has more resin (volatile oils) than sage, and density per bush is greater.
- Brush in California has similar burning properties.



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- c. This is a juniper brush burning in drought conditions with a wind push in North Dakota.
- d. Notice the amount of black smoke — there is much more resin (volatile oils) in juniper than in sage brush, and the density of vegetation per bush is greater.
- e. Much of the vegetation in southern California has similar burning properties.

### FUELS (HEAVY)

- Size is 3 inches in diameter or larger.
- Trees, logs, stumps, large limbs.
  - Thicker mass.
  - Slower to ignite.
  - Intense burning.
  - Long-lasting.



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- 3. Heavy fuels.
  - a. Fuels that are three inches in diameter or larger.
  - b. Examples of heavy fuels include trees, logs, stumps and large limbs.

- They are thicker in mass, slower to ignite, and burn with a longer intensity.
- Heavy fuels will just smolder if they have a lot of fuel moisture, but when dry, they will completely consume with the release of a tremendous amount of heat during a long period of time.

DVD PRESENTATION

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“FOREST FIRE”



Slide 2-12

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FOREST TREES

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- Running crown fires are extremely dangerous.
- Flame lengths of 200 feet or more.
- Usually uncontrollable until fuel or weather changes.

Slide 2-13

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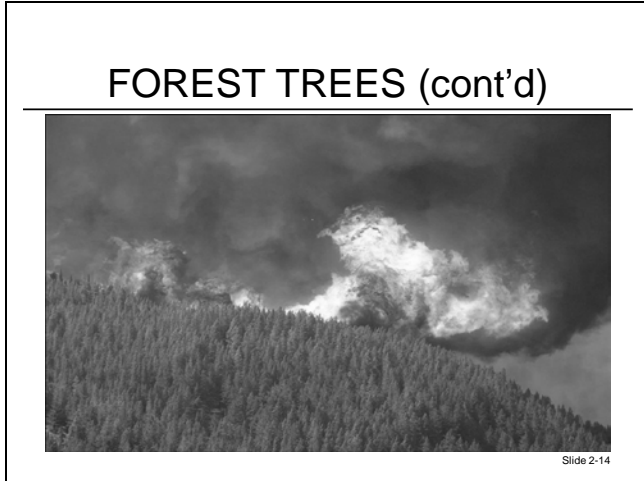
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- c. When a dense forest burns, like in the next slide, it is called a running crown fire. It is very intense and very dangerous.
- d. The 100-foot trees are producing flame lengths of 200 feet or more. This is a wind-driven fire that is totally uncontrollable, and it cannot be fought safely until it either runs into reduced fuels and/or the weather changes such that it reduces the fire behavior.
- e. Usually uncontrollable until fuel or weather changes.



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- f. Continuous thick canopy produces continuous crown fire runs.
- g. Fire burns fine, medium, and heavy fuels all at once, including all of the structures within this environment. There are no safe zones within these types of fire areas.



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- 4. Fuel moisture content is another important factor.
  - a. All fuels, wet from fall, winter, or spring precipitation, dry gradually throughout the summer from the outside in.
  - b. In the fall, as rain starts and temperatures or humidity levels increase, the process is reversed, and the fuel begins to take on moisture from the outside in.
  - c. The larger the fuel, the longer this process takes.

- d. The time it takes for the fuel to dry out depends on the temperature, wind, duration, size, type of fuel and exposure to the sun.
  
- e. Important principle: If the fire is burning primarily large fuels, water from hose streams hits them and ends up on the ground. There will be little reduced intensity of the fire. Due to the thickness and density of the fire burning within the fuel, water may not reach enough to cool much.

**FUEL MOISTURE VERSUS  
RELATIVE HUMIDITY**

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- During low relative humidity, moisture moves out of fuels into the air.
- During high relative humidity, moisture moves from the air into fuels.
- Fuels are generally categorized by the time it takes to fully equalize.
- Expressed as 1, 10, 100, and 1,000 hour fuels.

Slide 2-16

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- f. Relative humidity.
  - In low relative humidity, moisture moves out of fuels into the air.
  
  - In high relative humidity, moisture moves from the air into the fuels.
  
  - Fuels are generally categorized by the time it takes to fully equalize, if that were possible over time.
  
  - Fuels are expressed as one, 10, 100, and 1,000 hour fuels.

**CONTINUITY**

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- Horizontal continuity relates to the number of plants and spacing in given area.
  - Continuous fuel continuity equals fuels that are in contact with each other.
    - Dense, evenly distributed.
    - Uniform fire behavior.
    - Provides a continuous path for fire spread.

Slide 2-17

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5. Continuity.

- a. Horizontal continuity relates to the number of plants and the spacing between them in any given area.
  - Continuous fuel continuity is evenly distributed, dense fuels that provide a continuous path for fire spread.
  - Patchy or noncontinuous fuels are fuels intermixed with bare ground, rock outcrops, yards and roads.
  - They are more resistant to fire spread and have less intensity.
  - The fire behavior is more variable and less predictable.

**HORIZONTAL CONTINUITY**

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- Broken due to:
  - Topography.
  - Aspect.
  - Drainages.
  - Home sites.
  - Roads.
  - Fuel management.
- Fire easier to control.



Slide 2-18

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- Fuels may be broken due to topography, aspect, drainages, home sites, roads and fuel management.

- Fire is easier to control when the horizontal fuel continuity is varied and broken.

**VERTICAL CONTINUITY**

- Vertical continuity is arrangement from ground to treetops.
  - Ladder fuels are continuous from bottom to top.
  - Abundant, continuous ground fuels will support a more intense crown fire.



Slide 2-19

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b. Vertical continuity relates to the arrangement of fuel from the ground to the treetops.

- Ladder fuels provide vertical continuity from bottom to top.
- Abundant, continuous ground fuels will support a more intense crown fire.
- The photograph shows a single tree “torch out” in which there is dense fuel continuity from bottom to top.

**VERTICAL CONTINUITY (cont'd)**



Slide 2-20

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- With a dead, brown-needle spruce tree, it is not hard to get a tree to torch out with a single match or spark, even in winter conditions.

### SURFACE FIRE

- Needles and leaves.
- Grass.
- Small plants.
- Live and dead.
- Also known as litter layer.
- Generally low fire intensity.
- Usually easily controlled unless wind driven.



Slide 2-21

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6. Surface fires are fuels burning on or above the surface, such as needles, leaves, grass and small plants in the litter layer.
  - a. They have generally low fire intensity and are easily controlled by various fire suppression methods, unless there are high winds driving the fire.
  - b. If the ground fuels are more than six inches high, then the fire can become much more intense and less easily controlled.

### GROUND FIRE

- Smoldering beneath surface.
- Decomposing vegetation and roots.
- Only burns with prolonged drying.
- Can burn for weeks.
- May be hard to extinguish with water.
- May require hand line construction around perimeter.



Slide 2-22

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7. Ground fires are fuels burning beneath the surface, smoldering, and consist of decomposing vegetation and roots.
  - a. When prolonged drying occurs, as in a drought, all of the ground fuels are vulnerable to burning.
  - b. After a surface fire, ground fuels will consume slowly depending on how much fuel, how deep and how dry.

- c. Oftentimes, using water will only delay the burning process unless the whole area on fire is extinguished completely. This may be very hard to do. Constructing the fire line down to mineral soil, then allowing the smoldering ground fuels to burn out, can be an effective suppression strategy to control a fire during drought conditions.

### FUEL LOADING — THE ACCUMULATED BIOMASS

- Tons per acre.
- Condition (live or dead).
- Size.
- Arrangement.
- Used in fire behavior models to predict intensity.
- The more loading, the harder to extinguish.



Slide 2-23

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- 8. Fuel loading describes the accumulated biomass, usually expressed in tons per acre.
  - a. The more the fuel loading, the fewer options and opportunities there are for effectively suppressing fire. This may depend on:
    - Tons per acre.
    - Condition of fuel (live or dead).
    - Size of fuel.
    - Arrangement (vertical or horizontal).
  - b. Fuel loading is used in fire behavior modeling to help predict fire intensity and spread factors.

## FUELS AND WATER EFFECTIVENESS

- Fog stream or straight stream?
- At the flames or base of flames?
- At burning fuel or unburned fuel?
- At fuel or building?
- Water, foam or gel?
- No water at all?



Slide 2-24

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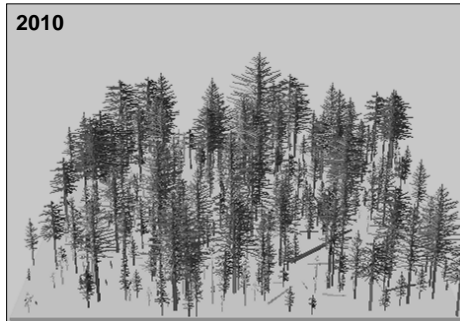
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9. Water effectiveness — there are many options for using water for suppression depending on the situation and fire behavior. Some options include:

- a. Fog stream or straight stream.
- b. At the flames or the base of flames.
- c. At burning or unburned fuels.
- d. At fuel or building.
- e. Use water, foam or gel.
- f. No water use.

## INCREASED FOREST FUEL — 100 OR MORE YEARS



Slide 2-25

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10. Forests grow trees (fuels) continuously, until a disturbance, such as a fire, restarts the forest growth again. The growth of a forest tends to be a long-term process. There are no predictable timetables or indicators that tell when fuels are building to critical levels.
  
11. Fuel accumulation refers to the amount of fuel accumulated over time.
  - a. In the western United States, most forested areas that grow pine and fir keep building fuel loading until it is logged, managed or a fire event occurs. It will eventually burn, and the intensity will depend on when and under what circumstances.
  - b. Generally, the longer the interval between fire events, the more severe the fire due to greater fuel loading.
  - c. Contrary to what some people think, leaving a forest alone with fire suppression will not eventually turn it into a red wood or sequoia forest. These forests need some fire for their perpetuation.
  - d. Prescribed fire is easiest to do when the fuel loading is light, but once there are substantial fuels present that have both horizontal and vertical continuity, it is extremely hard to initiate a light- to medium-intensity fire.
  - e. Either it will not carry, or it will burn too intensely. It may continue to smolder for a very long time if there is not substantial rain or snow after.
  - f. Prescribed fires are generally initiated either in spring or fall, depending on overall weather conditions and the desired results expected.

### HOMES, BUILDINGS AND VEHICLES

- Buildings close together, in alignment, burn like dominoes falling.
- Ignite from radiant heat, flame impingement or ember intrusion.



Slide 2-26

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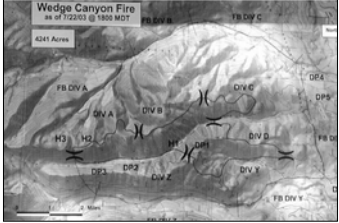
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- 12. Homes, out buildings and cars are also fuels in a WUI fire.
  - a. If homes are built close together and in alignment, they can ignite and burn like dominos falling down.
  - b. Either radiant heat, flame impingement or ember intrusion can cause ignition.

**TOPOGRAPHY**

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- Refers to the land's surface features.
  - Aspect.
  - Slope.
  - Elevation.
  - Canyons.
  - Mountains.
  - Saddles.
  - Bodies of water.



Slide 2-27

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D. Topography describes the land's surface features, such as aspect, slope, elevation, canyons, mountains, saddles, and bodies of water.

**EFFECTS**

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- Varies considerably due to features.
- Influences fire behavior, spread and direction.
- Effects are predictable.
- Will complicate, dictate and limit fire suppression options.
- Consider unusual regional topographic influences like sundowner or lake effects.

Slide 2-28

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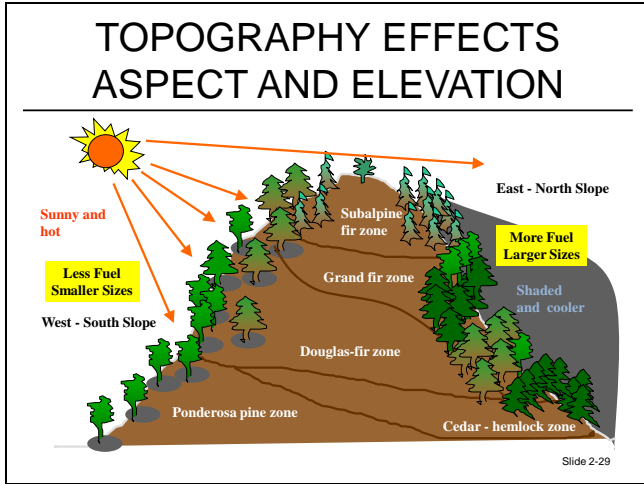
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- 1. Topography varies considerably due to many features.
- 2. It influences fire behavior, fire spread and direction.
- 3. The effects of topography on a fire are predictable and do not change, unlike wind, weather, and fuels.

- 4. Topography will complicate, dictate and limit suppression options.
- 5. Consider unusual regional topographic influences known to local firefighters. These may include sundowner effects, lake effects, etc.



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- 6. Aspect and elevation.
  - a. Aspect relates to the direction the slopes face and the effects due to the sunrays on them.
  - b. The north and east facing slopes are shaded, cooler and wetter.
  - c. The south and west facing slopes are sunnier, hotter and drier.
  - d. The north and east facing slopes have heavier and larger size fuels.
  - e. South and west facing slopes have lighter, fewer and smaller size fuels.
  - f. When the north and east facing slopes dry out, a fire can be much more intense due to more fuel loading. The effects vary in different regions depending on vegetation types and moisture.
  - g. Fires on south and west facing slopes are usually faster and more intense due to fuel types and dryness. Effects vary, depending on vegetation types and moisture content.
  - h. Elevation influences different types of fuel on various slopes and aspects.

**SLOPE**

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- The steeper the slope, the more intense and faster the fire will burn uphill.
- Homes should not overhang steep slopes.



Slide 2-30

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7. Slope.
  - a. The steeper the slope, the more intense and faster the fire will burn up the hill.
  - b. Homes should not overhang steep slopes.

**CHIMNEYS, CHUTES AND BOX CANYONS**

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Slide 2-31

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8. Chimneys, chutes and box canyons tend to significantly increase the intensity of wildland fire behavior as fire enters these features.
  - a. Significant firefighter injuries and fatalities have taken place in these features.
  - b. Significant consideration and caution must be used when attempting to fight fire in these features.

**NARROW CANYONS**

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- Channel winds can intensify fire behavior.
- Radiant heat and embers cross easily.



Slide 2-32

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9. Narrow canyons will channel winds and intensify fire behavior.
  - a. Radiant heat and burning embers cross easily to both sides.
  - b. Many firefighter injuries and fatalities have happened in narrow canyons.
  - c. Significant caution should be considered in these features.

**SADDLES**

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- Winds will intensify and eddy after going through a saddle.



Slide 2-33

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10. Winds will intensify and eddy after going through a saddle, like a Venturi effect.
  - a. This is not a safe place to be when fire is approaching.
  - b. Numerous firefighter injuries and fatalities have happened in saddles.

- c. Significant caution should be considered when operating near these features.

**BARRIERS**

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- Any obstruction to the spread of fire:
  - Natural or man-made.
  - Can slow or stop fire spread.
  - Use when available.



Slide 2-34

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- 11. Barriers are any obstruction to the spread of fire.
  - a. Topographical barriers can be natural or man-made (i.e., rock outcroppings, scree, dams, fire lines, roads, etc.).
  - b. These barriers are key components in slowing, stopping and suppressing wildland fires.
  - c. Use to advantage when available.
  - d. In this image, the road is being used as a fire break. When the conditions are right, a burnout operation can bring the fire to this road in a short timeframe, and the fire will be controlled after the fuel burns away and goes out.

**WEATHER FACTORS**

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- Wind.
- Temperature.
- Relative humidity.
- Precipitation.



Slide 2-35

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E. Weather factors.

1. Factors consist of wind, temperature, relative humidity and precipitation. There is not much you can do to influence the weather, but you should know what the weather is going to do and how it will affect fire behavior.
  - a. Incident Action Plans (IAPs) need to include information regarding predicted weather and predicted fire behavior.
  - b. Pay constant attention to weather conditions and changes during operational periods.

**WIND**

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- One of the most important influences on fire.



Slide 2-36

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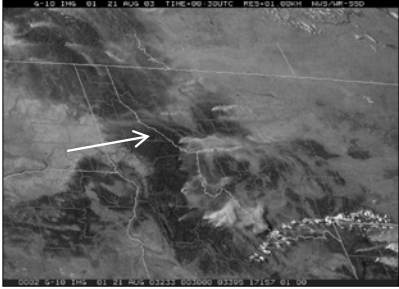
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2. Wind is one of the most important influences on fires. It pushes fire dramatically as winds increase.
  - a. Wind direction is expressed by the direction it is coming from. For example, wind coming from the west would be expressed as a west wind.
  - b. The photograph shows a 40 or more mph wind event that will push the fire for miles from the forest down through residential areas.
    - Notice that the fire is being pushed downhill by the wind.
    - Very little can be done with this fire until the winds die down.

### GRADIENT WIND

- The prevailing wind direction.



Slide 2-37

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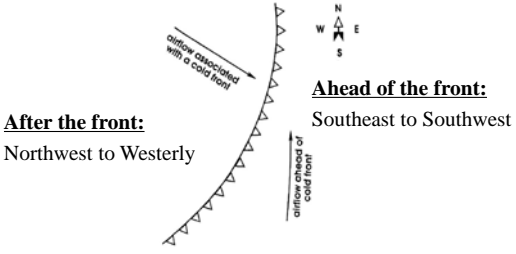
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- c. Gradient winds are also known as the prevailing wind direction.
- The prevailing wind direction determines the general direction the fire will travel.
  - Historic area fire progression maps and case studies will often give a good idea of what to expect.
  - In much of the western U.S., fire generally spreads from west to east due to prevailing winds from weather systems.
  - This picture shows the northwestern U.S. during a typical August day.

### COLD FRONT WINDS

- Winds increase velocity and change direction.



Slide 2-38

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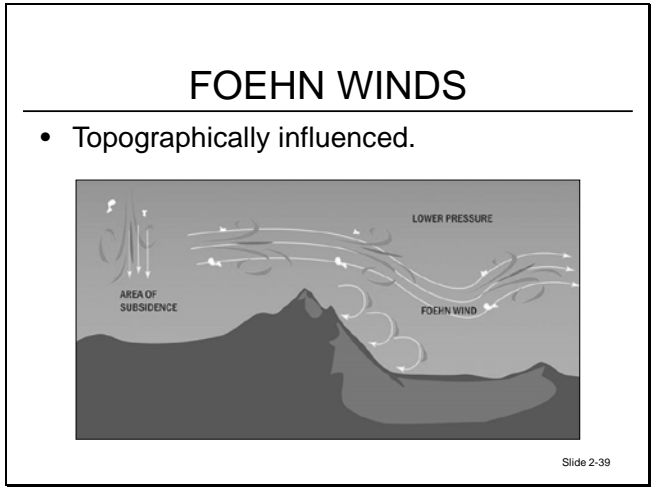
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- d. Cold front winds.
- Winds increase velocity and change directions during a cold front.

- The illustration shows a typical front for the western U.S. with wind direction and wind shifts relative to major weather system influences on the wind.
- Frontal winds vary in different parts of the country.



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- e. Foehn winds are a type of dry down-slope wind that occurs in the lee (downwind side) of a mountain range.
  - These usually occur following the passage of a cold front from an area of high pressure or subsidence toward an area of lower pressure.
  - Topography influences Foehn winds.
  - Foehn winds are known by many different names, such as Santa Ana, Chinook, sundowner, nor'easter, lake influence, etc.

**How Santa Ana winds develop**

- 1 Winds form in a high-pressure system while over the Great Basin between the Rockies and the Sierra Nevada Mountains.
- 2 Winds are forced between mountains through the passes to low-pressure systems off the Pacific Coast.
- 3 Winds blow from the deserts and down mountains.
- 4 Air is compressed and warmed, which lowers the humidity and dries out vegetation.
- 5 Winds gain speed as they squeeze through canyons, fanning fires.

Slide 2-40

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-- Santa Ana is an example of a Foehn wind that has a major influence on wildfire in southern California every fall.

**DVD PRESENTATION**

**“WIND, FUEL AND TOPOGRAPHY ALIGNMENT”**

Slide 2-41

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**TEMPERATURE/HUMIDITY**

- Provided by solar energy.
- Fuels and ground affected by radiation.
- Influence relative humidity.
- Influence firefighter physical abilities.

Slide 2-42

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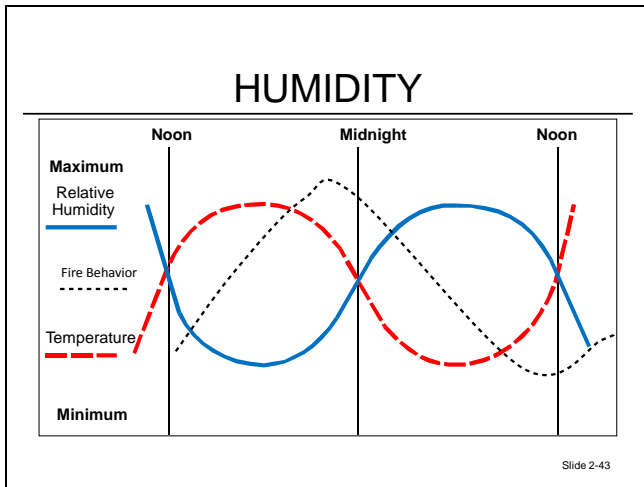
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- 3. Temperature is provided by solar energy.
  - a. It affects fuels and the ground by radiation.
  - b. It influences relative humidity.
  - c. Temperature affects firefighters' physical abilities.



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- d. Relative humidity is inversely related to temperature.
  - The hotter it is and the more solar energy, the lower the relative humidity.
  - The lower the relative humidity, the more intense the fire will burn.

### TEMPERATURE EFFECT ON FUELS

- Direct sunlight versus shade.
- Heated fuel will burn more readily.
- Heated fuel has lower relative humidity, warmer temperature and lower fuel moisture.

Slide 2-44

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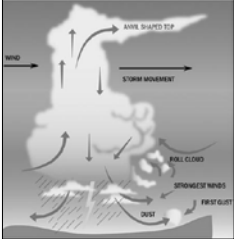
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- e. Heated fuel (fuels in the direct sunlight) will burn more readily due to lower fuel moisture.

- f. Heated fuels have lower relative humidity, higher temperature, and lower fuel moisture.

**THUNDERSTORMS**

- Produced by cumulonimbus clouds.
- Thunderstorms produce:
  - Lightning and thunder.
  - Strong gusty wind and out drafts.
  - Rain and hail are possible.



Slide 2-45

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- 4. Thunderstorms.
  - a. Thunderstorms are produced by cumulonimbus clouds.
  - b. They are accompanied by strong gusty wind, out drafts, lightning, thunder and sometimes hail.

**THUNDERSTORMS (cont'd)**

- Clouds provide visual clues to weather events about to happen.
- Firefighters must monitor weather continuously.
  - Winds.
  - Temperature.
  - Relative humidity.



Slide 2-46

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- c. Clouds provide visual clues to weather events.
- d. Firefighters must monitor weather continuously (winds, temperature and relative humidity).
- e. The photograph shows a very strong out draft from a major thunderstorm.

**STABLE AIR**

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- Visual indicators:
  - No vertical cloud or column growth.
  - Smoke stays near the ground.
  - Calm winds.
- Good conditions for fighting fire.



Slide 2-47

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- 5. Atmospheric conditions.
  - a. Typical visual indicators of stable air include no vertical cloud or column growth, smoke staying near the ground, and calm winds. These are good conditions for fighting fires.

**UNSTABLE AIR**

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- Visual indicators:
  - Vertical cloud growth.
  - Smoke rises to great heights.
  - Gusting winds.
  - Dust devils.
- Poor conditions for fighting fire.
- Fire burns with much greater intensity when air is unstable.



Slide 2-48

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- b. Typical visual indicators of unstable air include vertical cloud growth, smoke rising to great heights, gusting winds, and dust devils. These are poor conditions for fighting fires. Fire burns with more intensity when the atmospheric conditions are unstable.

### THERMAL BELT

- Warm air mass trapped between two layers of colder air.
- Region of warmer air on middle third of slope.
- Only in mountainous terrain.
- Fire burns more actively in thermal belt compared to above or below it.



Slide 2-49

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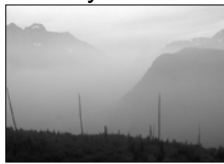
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6. Thermal belt is a warm air mass trapped between two layers of colder air.
  - a. Thermal belts are regions of warmer air on the middle third of a slope.
  - b. They are found only in mountainous terrain.
  - c. May allow fire to burn more actively in this thermal belt, than above or below it on the same slope.

### INVERSION

- Created by high pressure; puts cap over fire.
- Can last for weeks.
- Fire behavior decreases during inversion.
- Fire behavior increases drastically as the inversion lifts.
- Atmosphere is stable and changes to unstable.
- Use caution during lifting.



Slide 2-50

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7. Inversion is created by high pressure, putting a cap over the fire, and not allowing warmer air and smoke to rise like normal.
  - a. They can last for weeks.
  - b. Fire behavior decreases during an inversion, but smoke is trapped close to the ground, failing to rise, and causing visibility and health issues for those in this atmosphere for long periods.

- c. Fire behavior can increase drastically when inversion breaks through the cooler atmosphere above.
- d. Atmosphere is stable and changes to unstable as inversion lifts.
- e. Use caution during lifting of inversion, due to rapid and extreme fire behavior changes.

**III. EXTREME FIRE BEHAVIOR**

**EXTREME FIRE BEHAVIOR**

- Intense fire activity that presents a very hazardous fire ground environment to firefighters.
- Use of escape routes; safe area may be best.
- Strategies and tactics normally used for controlling fire are not appropriate.

Slide 2-51

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- A. There are times when fire behavior becomes extreme, and intense fire activity presents a very hazardous fire ground environment to firefighters.
- B. A Company Officer (CO) needs to recognize when this is occurring and adjust the strategy being employed to provide for the safety of personnel under their responsibility. Sometimes disengaging and using escape routes to a safe refuge area until conditions change will be the smartest thing to do.
- C. Strategies and tactics normally used for controlling fires may not be appropriate.

## EXTREME FIRE BEHAVIOR (cont'd)

- Usually a combination of fuel, topography and weather in alignment.
- Firefighter safety can be compromised.

Slide 2-52

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- D. Extreme fire behavior is usually a result of fuel, topography and weather all coming into alignment.
- E. Firefighter safety can be compromised, and numerous injuries and fatalities have occurred during extreme fire behavior. For example, during the Los Angeles, California, Station Fire on Aug. 30, 2009, two firefighters were killed during extreme fire behavior at Los Angeles County Fire Camp 16.
- F. The photograph shows an intense fire from very heavy fuels.

## INTENSE FIRE FROM VERY HEAVY FUELS



Slide 2-53

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**DVD PRESENTATION**

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**“STATION FIRE ON ANGELES  
NATIONAL FOREST IN LOS  
ANGELES COUNTY, CALIFORNIA”**



Slide 2-54

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**Fire's  
DANGER  
zone**

Fire poses the greatest threat to life, limb, and property in the wildland. Understanding the fire process is essential to the firefighter's survival.

**INDICATORS OF A FIRE BEING  
EXTINGUISHED**

**INDICATORS OF A FIRE BEING  
DEVELOPING**

Slide 2-55

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**GENERAL INDICATORS**

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- Spot fires.
- Smoke column rotation.
- Developing active fire.
- Smoke color.
- Smoke volume.

Slide 2-56

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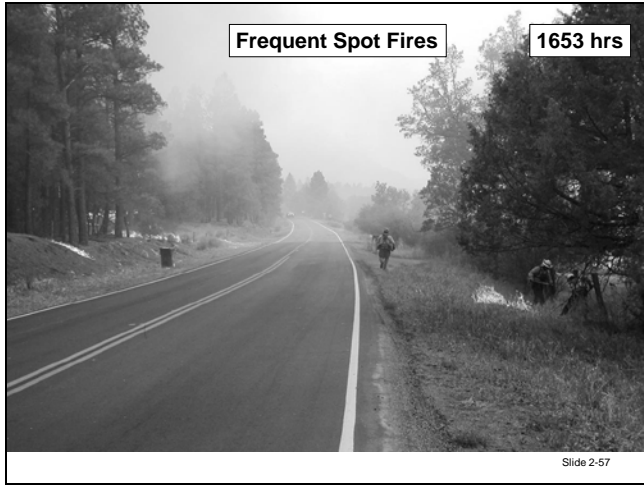
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- G. General indicators of extreme fire behavior include the following:
1. Spot fires — easy ignition, long distance, increasing numbers or frequency.

2. Smoke column rotation with spin off dust devils or whirls.
3. Developing active fire that is crowning or running.
4. Smoke color changing from white or gray to dark blacks.
5. Smoke volume rapidly increasing and rising.



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H. Case history of the Missionary Ridge Fire of 2002 in Durango, Colorado.

1. Notice the time from which these photographs were taken — a total of 13 minutes.
2. 1653 hours: The road provides easy egress out of this fire area, but many WUI locations do not have easy access or egress.



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3. 1655 hours: The incident is rapidly developing into running fires.



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4. 1656 hours: When trying to catch and extinguish spot fires is no longer working, it is time to leave the area and rethink the operations plan.



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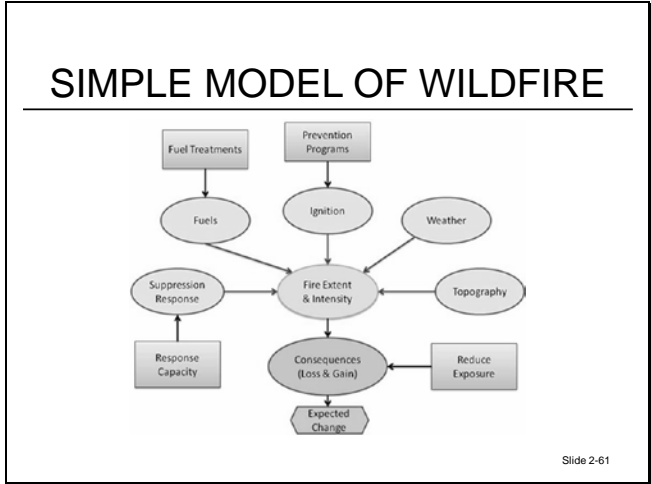
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5. 1706 hours: There are homes in the intense fire area. It is time to regroup and prepare to go back once the fire intensity dies down to overhaul homes that have ignited.



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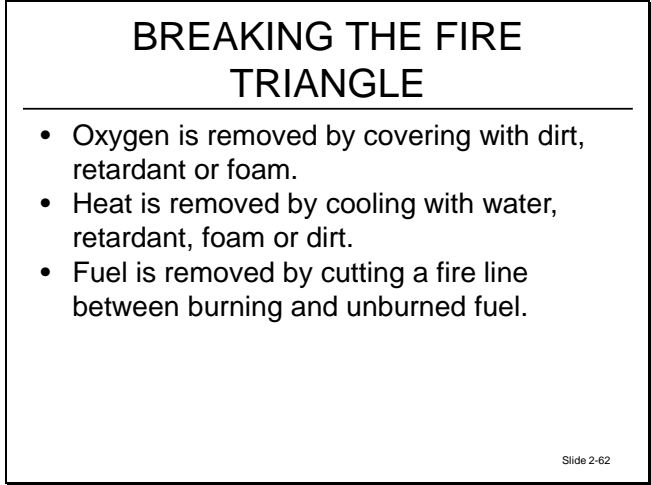
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I. Simple model of wildfire.

1. The diagram is a simple conceptual model of wildfire, its contributing factors, consequences, and management options.
2. The only two components that we can change are fuels (through fuel treatments) and suppression (through response capacity and capability).
3. The more fuels or fuel loading, the less effective the suppression capability.



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J. By recognizing how wildfires ignite homes and other structures, you can break the fire triangle.

1. Covering the fire with dirt, retardant or foam removes oxygen from the fire.
2. Cooling the fire with water, retardant, foam or dirt removes heat.

3. Cutting a fire line between burning and unburned fuels removes fuel.

#### IV. STRUCTURE IGNITION

**STRUCTURE IGNITION**

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- Conduction — direct flame impingement.
- Convection — too much fuel is burning too hot near buildings (not a significant cause in WUI).
- Radiation — too much fuel too close.
- Spark and ember ignition — most common after clearing and mitigating natural fuels.

Slide 2-63

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- A. Structures can ignite through the following ways:
  1. Conduction — direct flame impingement. This would be the most probable cause of ignition if homeowners have not reduced natural fuels and man-made fuels from their buildings.
  2. Convection — when too much fuel is burning too hot near the buildings.
  3. Radiation — when too much fuel is too close.
  4. Spark and ember intrusion/ignition are most common when homeowners have cleared and mitigated natural fuels.
- B. Most homeowners do not recognize the potential spark and ember intrusion/ignition sources in and around their homes.
- C. The interactions of fuels, topography, and weather and how they combine will influence fire behavior.

DVD PRESENTATION

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“FIRE BEHAVIOR IN THE WILDLAND URBAN INTERFACE”



Slide 2-64

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V. SUMMARY



SUMMARY

- Why are fire behavior and weather considerations important to the structural Company Officer (CO)?
- Factors that affect wildland fire behavior.
- Extreme fire behavior.
- Structure ignition.

Slide 2-65

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# APPENDIX

## ADJECTIVE RATINGS FOR FIRE BEHAVIOR

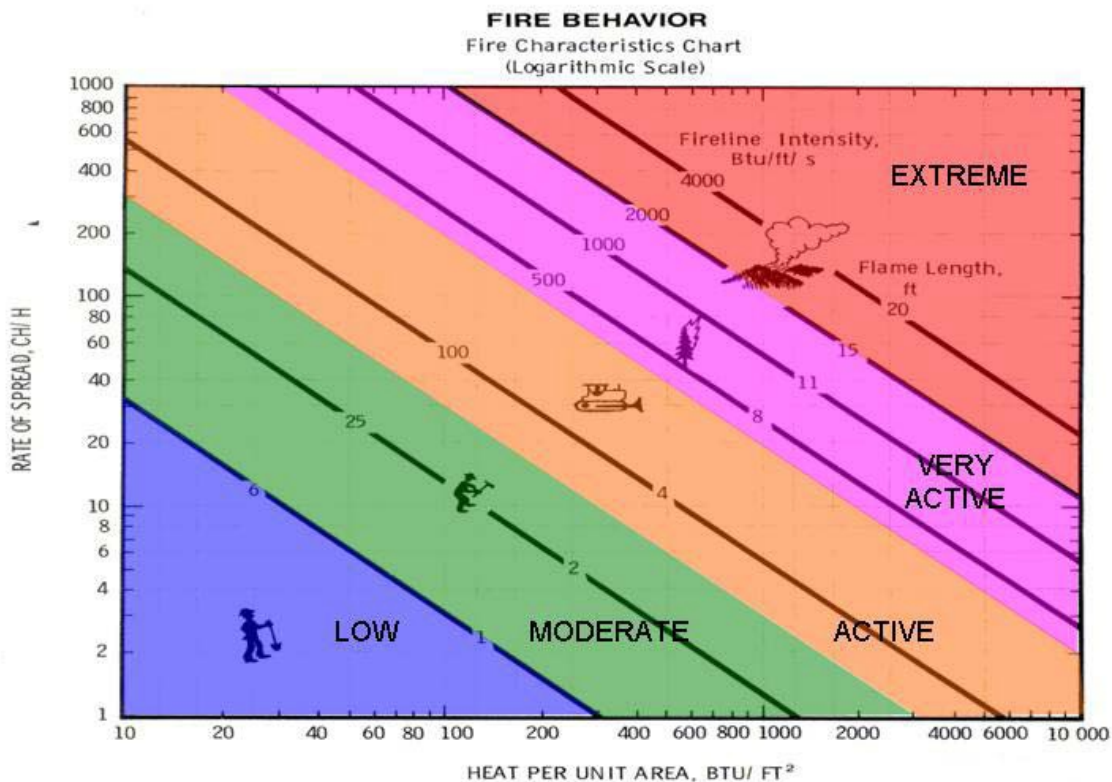
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### Adjective Ratings for Fire Behavior

For many years now in America we have used the National Fire Danger Rating System (Deeming, et al, 1978) adjective ratings to describe the “fire danger” for a given parcel of wildland. These ratings of low, moderate, high, very high, and extreme carried some degree of descriptive advice of the “danger” of having an ignition based on historic weather data for what kind of fire to expect on any given day and place. Nowhere, however, was there any universal description of what these ratings meant regarding potential fire behavior. Furthermore, they described “fire danger” which is clearly something different from fire behavior.

Fire behavior is described most simply in terms of fire line intensity (in feet of flame length) and in rate of spread (in chains per hour). The Fire Behavior Fire Characteristics Chart (fig. 1), or “Haul Chart” as firefighters call it (Andrews and Rothermel, 1982), plots fire behavior in terms of heat per unit area released (as BTUs per square foot, as the X axis) versus rate of spread (as chains per hour, as the Y axis).

**Figure 1. Fire Characteristics (Haul) Chart Including Adjective Ratings for Fire Behavior**



The Haul Chart was so named because it infers the relative intensity of the fire behavior through graphical representations of firefighters working — haul firefighters, equipment working — haul equipment, trees torching — haul retardant, and crown fire — haul everybody to safety. Since fire line intensity and flame length are directly proportional (Byram, 1959) — the larger one gets the larger the other gets — and since we can visually assess the flame length the Haul Chart is an excellent tool for measuring the safety and effectiveness of various fire line resources.

The fire line interpretations of the Haul Chart are as follows:

**Figure 2. Haul Chart Interpretations (from Fireline Handbook, Appendix B.)**

Flame Length (Feet)	Fireline Intensity (Btu/Ft/Sec)	Interpretations
0-4	0-100	Persons using handtools can generally attack fires at the head or flanks. Hand line should hold the fire.
4-8	100-500	Fires are too intense for direct attack on the head by persons using handtools. Hand line can not be relied on to hold fire. Equipment such as dozers, engines, and retardant aircraft can be effective.
8-11	500-1,000	Fires may present serious control problems such as torching, crowning, and spotting. Control efforts at the head of the fire will probably be ineffective.
11+	1,000+	Crowning, spotting, and major runs are common, control efforts at the head of the fire are ineffective.

When discussing relative fire behavior ratings as a Fire Behavior Analyst, I have found that it makes most sense to relate the fire behavior to the Haul Chart and to the obvious implications to both efficiency and safety. I have found that the simplest terms to describe fire behavior are the adjective ratings of **LOW**, **MODERATE**, **ACTIVE**, **VERY ACTIVE**, and **EXTREME**. Over many years, working both as an on-the-line FBAN and as a GACC FBAN, I have found it most important to be able to describe in simple terms the intensity of the fire behavior to be expected and then the obvious implications to firefighter effectiveness and safety. My adjective ratings use slightly different break points in the interest of firefighter safety. These are graphically represented in Figure 1 and are listed below in Figure 3.

**Figure 3. Adjective Ratings for Fire Behavior**

<b>ADJECTIVE RATING</b>	<b>FLAME LENGTH</b>	<b>IMPLICATION</b>
<b>LOW</b>	0-1	Fire will burn and will spread; however, it presents very little resistance to control, and direct attack with firefighters is possible.
<b>MODERATE</b>	1-3	Fire spreads rapidly presenting moderate resistance to control but can be countered with direct attack by firefighters.
<b>ACTIVE</b>	3-7	Fire spreads very rapidly presenting substantial resistance to control. Direct attack with firefighters must be supplemented with equipment and/or air support.
<b>VERY ACTIVE</b>	7-15	Fire spreads very rapidly presenting extreme resistance to control. Indirect attack may be effective. Safety of firefighters in the area becomes a concern.
<b>EXTREME</b>	>15	Fire spreads very rapidly presenting extreme resistance to control. Any form of attack will probably not be effective. Safety of firefighters in the area is of critical concern.

There are other systems for adjective rating of fire behavior that use the different fuel models and run various inputs through BEHAVE achieving widely variable outputs. These are certainly useful for site-specific projections and should be used for specific wildland fires. I believe, however, that this simplified approach linking fire line intensity to firefighter effectiveness and safety is more appropriate for description of fire behavior potential over larger geographic areas.

Tim Stubbs  
 Fire Behavior Analyst  
 June 14, 2005

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# **UNIT 3: COMMAND AND CONTROL ISSUES OF THE WILDLAND URBAN INTERFACE**

## **TERMINAL OBJECTIVE**

*The students will be able to:*

- 3.1 *Evaluate the effectiveness of operations and safety issues at a Wildland Urban Interface (WUI) incident.*

## **ENABLING OBJECTIVES**

*The students will be able to:*

- 3.1 *Determine operational responsibilities of command and control at the Company Officer (CO) level.*
  - 3.2 *Identify operational responsibilities in initial attack, extended attack, and for long duration incidents.*
  - 3.3 *Describe the system of equipment and personnel typing used in wildland firefighting.*
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**UNIT 3:  
COMMAND AND CONTROL  
ISSUES OF THE WILDLAND  
URBAN INTERFACE**

Slide 3-1

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**ENABLING OBJECTIVES**

- Determine operational responsibilities of command and control at the Company Officer (CO) level.
- Identify operational responsibilities in initial attack, extended attack, and for long duration incidents.

Slide 3-2

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**ENABLING OBJECTIVES  
(cont'd)**

- Describe the system of equipment and personnel typing used in wildland firefighting.

Slide 3-3

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I. COMMAND AND CONTROL

**COMMAND AND CONTROL**

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- The structural CO may be placed in any of the following three situations:
  - Initial attack.
  - Extended attack.
  - Support role.
- Must be able to understand and adapt to the assignment.

Slide 3-4

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- A. The structural Company Officer (CO) may be placed in any of the following three situations:
  - 1. Initial attack.
  - 2. Extended attack.
  - 3. Support role.
- B. The structural CO must be able to understand and adapt to the assignment.

II. INITIAL ATTACK

**INITIAL ATTACK**

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- Actions taken by the first-to-arrive resource.
  - There is only **one** initial attack.
    - Size-up.
    - Firefighter safety.
    - Communications.
    - Suppression activities.
  - Is fire suppression a primary or secondary concern?

Slide 3-5

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- A. Actions taken by the first resource (person, unit or crew) to arrive on-scene. This is commonly referred to as the first hour, plus up to 12 hours of the initial incident response.
1. There is only **one** initial attack. (That is why it is called initial attack.)
    - a. Size-up is the initial incident assessment. It includes the who, what, where, when, why and how of the incident.
    - b. Firefighter safety is your number one priority, so protect yourself, protect others, protect the environment, and protect assets (property and infrastructure).
    - c. Communications. Ensure that good communication is established between you, your company/crew, dispatch, and other resources assigned.
    - d. Suppression activities. The first assigned resource must determine the full extent of what resources will be needed to mitigate this incident. Once this is accomplished, then commit to suppression activities, remembering to tie the fire to a secure spot, often called “anchoring” the fire.
  2. Is fire suppression a primary or secondary concern?

<b>TAKE CONTROL OF THE INCIDENT</b>
<ul style="list-style-type: none"><li>• Advise dispatch of your arrival.</li><li>• Name the incident.</li><li>• Give a brief size-up.</li><li>• State who is Incident Commander (IC).</li><li>• Start an Incident Command System (ICS) Form 201, Incident Briefing.<ul style="list-style-type: none"><li>– What is the initial situation, priorities, etc.?</li><li>– What does your ICS organization consist of?</li><li>– Keep track of resources on-scene/requested.</li></ul></li></ul>
<small>Slide 3-6</small>

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- B. Take control of the incident.
1. Advise dispatch of your arrival, place yourself on-scene and in command of the incident.
  2. Name the incident. Usually we use a geographic location, that is, first Street Command.

3. Give a brief size-up. (Remember, the who, what, where, when, why and how of the incident.)
4. State who is the Incident Commander (IC). Use your assigned unit, that is, Engine 21 is in Command.
5. Start an Incident Command System (ICS) Form 201, Incident Briefing.
  - a. What is the initial situation, priorities, objectives, current actions, planned actions, safety concerns, and incident potential?
  - b. What does your ICS organization consist of?
  - c. Keep track of resources on-scene and those you have requested.

**SIZE-UP**

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- Gather information from dispatch.
  - Reporting party.
    - Their name.
    - Their location.
    - Are they on-scene or just seeing smoke?
    - Call-back number.
    - Landowner name may give a clue to the location.

Slide 3-7

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- C. Size-up. Part of the initial size-up includes gathering facts of the incident, which include:
1. Gather information from dispatch.
    - a. Name of the reporting party.
    - b. Location of the reporting party.
    - c. Is the reporting party on-scene or just seeing smoke?
    - d. Call-back number of the reporting party.
    - e. Landowner name may give a clue to the location.

**SIZE-UP (cont'd)**

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- Access.
  - Address.
  - Crossroads.
  - Directions.
  - GPS coordinates.
  - Local landmarks.
  - Compass points.



Slide 3-8

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2. Access. Determine the best and safest ways to get resources/personnel into and out of the incident. Here are key examples:
  - a. Address.
  - b. Crossroads.
  - c. Directions.
  - d. GPS coordinates.
  - e. Local landmarks.
  - f. Compass points.

**SIZE-UP (cont'd)**

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- Involvement.
  - What's burning? — vegetation fuel type(s).
    - Grass.
    - Brush.
    - Trees.
    - Cash crops.
    - Structures or out-buildings.



Slide 3-9

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3. Involvement. Determine what is involved; is it vegetation, structures, etc.?
  - a. What's burning? — vegetation fuel type(s).

- Grass — flashy, quick-burning fuel.
- Brush — longer burning.
- Trees — higher heat output.
- Cash crops — expense.
- Structures or out-buildings.

### SIZE-UP (cont'd)

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- Why is it burning?
  - Controlled burn.
    - Agricultural requirement.
    - Weed control.
    - Understory elimination.
    - Slash pile.



Slide 3-10

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b. Why is it burning?

- Was it due to a controlled burn?
  - Agricultural requirement.
  - Weed control.
  - Understory elimination.
  - Slash pile.

**SIZE-UP (cont'd)**

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- Accidental start.
  - Lightning.
  - Trash.
  - Campfire.
  - Discarded smoking materials.
  - Motor vehicle incident.
  - Downed power lines.

Slide 3-11

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- Was it because of an accidental start?
  - Lightning, is there going to be more?
  - Trash, preserve the start point.
  - Campfire, preserve the start point.
  - Discarded smoking materials, preserve the start point.
  - Motor vehicle incident.
  - Downed power lines. Count the wires on both sides of the power poles. Are they the same or is one missing?

**SIZE-UP (cont'd)**

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- Deliberate act.
  - Revenge against landowner.
  - Infrastructure disruptions.
  - Evidence destruction.

Slide 3-12

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- Was it a deliberate act?

- Revenge against landowner. For example, disputes over hunting rights.
- Infrastructure disruptions. For example, possible terrorist activities.
- Evidence destruction. Watch for vehicles leaving the scene, and record the description.

**SIZE-UP (cont'd)**

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- Involvement.
  - Size of the fire.
    - Area — a football field is about 1.5 acres.
    - Flame length — inches or feet?
    - Rate of spread — moving faster than you can walk?

Slide 3-13

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- c. Determine the size of the fire. Try and get a reference to something common to most people, such as:
- Area. (A football field is about 1.5 acres.)
  - Flame length (inches or feet?).
  - Rate of spread. (Is the fire moving faster than you can walk?)

**SIZE-UP (cont'd)**

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- Exposures.
  - Structures.
    - Structure use.
    - Proximity to fire.
    - Access.
  - Infrastructure.
    - Transportation.
    - Power lines and communications.
    - Water storage tanks.



Slide 3-14

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4. Exposures: (What else is proximate and may become involved?).

a. Structures.

- Structure use. Is it a residence, barn, storage shed?
- Proximity to fire. Is it immediate or future?
- Access. Engine or on foot?


b. Infrastructure.

- Transportation.
- Power lines and communications.
- Water storage tanks.

**SIZE-UP (cont'd)**

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- Hazards.
  - Utility lines.
  - Fence lines.
  - Livestock.
  - Low trees.
  - Septic tanks.
  - Narrow roads and bridges.
  - Hazardous materials.



Slide 3-15

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5. Hazards.

- a. Utility lines. Downed power lines are a shock hazard.
- b. Fence lines limit access and escape.
- c. Livestock.
- d. Low trees may cause damage to apparatus.
- e. Septic tanks. Watch out for hidden pits. This includes swimming pools.
- f. Narrow roads and bridges. Is there access to the scene that is safe?

g. Hazardous materials. What is really in that storage shed?

### RESPONSIBILITIES AS IC

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- Safety.
  - Firefighters.
    - Continual size-up.
    - Accountability.
    - Proper personal protective equipment (PPE).
    - Hydration.
    - Food.
    - Additional resources.

Slide 3-16

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D. Responsibilities as an IC.

1. As an IC, you are responsible for the health and welfare of all personnel/citizens who could be affected or impacted by this incident. You need to consider the safety of all of the following.

a. Firefighters. This is accomplished by:

- Continual size-up — situational awareness.
- Accountability. Track where your resources are. Remember to conduct Company Accountability Reports (CAR) and/or Personnel Accountability Reports (PAR).
- Proper personal protective equipment (PPE). Ensure that all members are compliant, including you!
- Hydration. This also includes establishing a rehabilitation unit/area.
- Food. (Consider a nutritional meal, and be considerate of allergies of your personnel.)
- Additional resources. This is commonly met by ensuring that they receive a briefing to the incident prior to deploying them to their assignment.

**RESPONSIBILITIES AS IC (cont'd)**

- Civilians.
  - Evacuation.
  - Animals and livestock.
  - Traffic control.
  - Life safety.

Slide 3-17

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b. Civilians.

- Evacuations. Need to be planned out ahead of time and require sufficient resources to implement. Establish trigger points to ensure evacuation is implemented prior to the real need.
- Animals and livestock. Residents do not want to leave their animals behind. Prior preparation includes identifying resources that are trained and can assist in evacuation of large/small animals.
- Traffic control. You need to think big and ensure that choke points don't back up persons evacuating. This means sufficient law enforcement, one-way roads, control of stop signs or traffic lights, etc.
- Life safety. Remember: Life safety is our number one priority.

**RESPONSIBILITIES AS IC (cont'd)**

- Other resource possibilities.
  - Utility companies.
  - Law enforcement.
  - Medical.
  - Refueling sources.
  - Expert advisors.
  - Key holders.
  - Radio Amateur Civil Emergency Services (RACES).

Slide 3-18

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- 2. Other resource possibilities. These resources often fit into the category of assisting agencies or contributing agencies. If they do not, that is a perfect time to institute a Liaison Officer to manage all stakeholders. These can include:
  - a. Utility companies.
  - b. Law enforcement.
  - c. Medical — firefighters and public.
  - d. Refueling sources.
  - e. Expert advisors.
  - f. Key holders.
  - g. Radio Amateur Civil Emergency Services (RACES) — a valuable communications resource.

**RESPONSIBILITIES AS IC (cont'd)**

- Responsibility of CO as IC.
  - Command change.
    - Be ready to turn over the incident to a higher-ranking officer or other Command entity.
    - Use ICS Form 201, Incident Briefing as a briefing tool.

Slide 3-19

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- 3. Command change.
  - a. Be ready to turn over the incident to a higher-ranking officer or other Command entity.
  - b. Use ICS Form 201 as a briefing tool. But in order for this to happen, you must put pen to paper and document the response as it happens. Otherwise, it is often forgotten.

III. EXTENDED ATTACK

**EXTENDED ATTACK**

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- Definition of extended attack.
  - Incident has moved or will move into an additional operational period.
  - Incident is divided, but less than five Divisions.
  - Increased resources on-scene.
  - Establish Staging Areas.
  - Some Command and General Staff positions filled.

Slide 3-20

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A. Definition:

1. Incident has moved or will move into an additional operational period. Operational period is usually 12 hours.
2. Incident is divided, but less than five Divisions.
3. Increased resources on-scene to meet the demands, scope and complexity of the incident.
4. Establish Staging Areas to manage resources arriving that have not been assigned. This includes making someone the Staging Area Manager.
5. Some Command and General Staff positions filled. Often, this includes a Safety Officer, Public Information Officer (PIO), Liaison Officer, Resource Unit Leader, Situation Unit Leader, Operations Section Chief (OSC), etc.

**RESPONSIBILITIES OF CO AS  
IC**

- Additional resources.
- Withdraw from suppression activities.
- Establish a Command Post (CP).
- Create and assign supervisory roles.
- ICS Form 201.
- Communications.
- Command.

Slide 3-21

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- B. Responsibility of CO as IC. As the IC, you are the key figure to get the incident started off in the right direction. Considerations include:
1. Recognize the need for additional resources. How long will it take for additional resources to arrive?
  2. Recognize the need to personally withdraw from suppression activities.
  3. Recognize the need to establish a Command Post (CP).
  4. Recognize the need to create and assign supervisory roles — span of control.
  5. Use ICS Form 201, Incident Briefing. No person or unit should be assigned without first receiving an incident briefing.
  6. Communications. Remember, as the IC, to ensure that you use updated size-ups to personnel on-scene and to ensure accountability through CAR and PAR.
    - a. Status of fire and extinguishment efforts.
    - b. Need for additional fire resources.
    - c. Need for law enforcement resources.
    - d. Hazards or exposure problems.
    - e. Changes in weather.
    - f. Locations of water supply.

- 7. Command. As the IC, you are responsible for this (unless you have an assigned OSC):
  - a. Divide the incident into manageable areas.
  - b. Assign Command responsibility for resources in these areas.
  - c. Create Strike Teams or Task Forces with leaders and assign.
  - d. Establish water supply points and refill points.
  - e. Set up Staging with a separate communications channel. This eliminates tactical resources having their messages cut off when Units start to arrive in the Staging Area.
  - f. Consider the need for resources rotations and rehabilitation.
  - g. Consider the need for equipment refueling and maintenance.

**IV. CHANGE OF COMMAND**

**CHANGE OF COMMAND**

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- Preferably a face-to-face briefing.
  - Remember to use ICS Form 201.
  - Provide incident status information to oncoming IC.
  - Allows for questions and answers.
  - Outgoing IC may be moved to a different position within the command structure.

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- A. Preferably this should be a face-to-face briefing.
  - 1. Remember to use ICS Form 201 for the briefing.
  - 2. Provide incident status information to oncoming IC.
  - 3. The briefing allows for questions and answers.

- 4. Outgoing IC may be moved to a different position within the command structure. Commonly, this could be a Deputy IC, Planning Section Chief (PSC), or an OSC.

**CHANGE OF COMMAND**  
(cont'd)

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- Current incident status — basic information.
  - Name of the incident.
  - Authority having jurisdiction (AHJ).
  - Other agencies on-scene.
  - Location of the incident and maps.
  - Communications setup.

Slide 3-23

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- B. The briefing must include current incident status, such as:
  - 1. Basic information.
    - a. Name of the incident.
    - b. Authority having jurisdiction (AHJ).
    - c. Other agencies on-scene.
    - d. Location of the incident and maps.
    - e. Communications setup.

**CHANGE OF COMMAND**  
(cont'd)

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- Current incident status — the fire.
  - Size of the incident.
  - Current fire behavior.
  - Expected fire behavior.
  - Fuel types involved or possibly involved.
  - Potential exposures.
  - Control efforts and level of success.
  - Water supply.

Slide 3-24

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2. Facts regarding the fire.
  - a. Size of the incident.
  - b. Current fire behavior.
  - c. Expected fire behavior.
  - d. Fuel types involved or possibly involved.
  - e. Potential exposures.
  - f. Control efforts and level of success.
  - g. Water supply.

<b>CHANGE OF COMMAND (cont'd)</b>
<ul style="list-style-type: none"><li>• Current incident status — resources.<ul style="list-style-type: none"><li>– Assigned resources.</li><li>– Ordered (en route) resources.</li><li>– Resources in Staging.</li><li>– Radio communications.</li><li>– Resource transportation.</li></ul></li></ul>
<small>Slide 3-25</small>

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3. Resources.
  - a. Assigned resources.
  - b. Ordered (en route) resources.
  - c. Resources in Staging.
  - d. Radio communications.
  - e. Resource transportation.

**CHANGE OF COMMAND  
(cont'd)**

- Current incident status — public safety.
  - Evacuation plans.
  - Scene security.
  - Notification procedures.
  - Evacuation routes.
  - Shelter locations.

Slide 3-26

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4. Public safety.
  - a. Evacuation plans.
  - b. Scene security.
  - c. Notification procedures.
  - d. Evacuation routes.
  - e. Shelter locations.

**CHANGE OF COMMAND  
(cont'd)**

- Use of organized amateur radio operators.
  - Helps relieve public service radio burden.
  - Many groups already working with Red Cross.

Slide 3-27

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- f. Use of organized amateur radio operators.
  - Helps relieve public service radio burden.
  - Many groups are already working with the Red Cross.

**CHANGE OF COMMAND  
(cont'd)**

- Current incident status — other safety.
  - Utility locations.
  - Bridge weight limits.
  - Roadway hazards.
  - Natural hazards.
  - Commercial hazards.

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5. Other safety concerns.
  - a. Utility locations.
  - b. Bridge weight limits.
  - c. Roadway hazards.
  - d. Natural hazards.
  - e. Commercial hazards.

**V. SINGLE RESOURCE**

**SINGLE RESOURCE**

- Definition:
  - A trained, skilled individual.
  - A piece of equipment with its crew and supervisor.
  - A crew or team of individuals with their supervisor.

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- A. Definition.
  1. A trained, skilled individual, for example, a chain saw operator (sawyer).

2. A piece of equipment with its crew and supervisor, such as the engine company and hot shot crew.
3. A crew or team of individuals with their supervisor. As an example, Hand Tool Team and Medical Triage Team.

**SINGLE RESOURCE (cont'd)**

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- May be assigned to a variety of situations.
  - Local jurisdiction response.
  - Area mutual aid.
  - Assisting in statewide mutual-aid pact.
  - Assisting in regional mutual-aid pact.
  - Assisting in a national multistate or multiagency response.

Slide 3-30

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- B. Single resources may be assigned to a variety of situations.
1. Local jurisdiction response.
  2. Area mutual aid.
  3. Assisting in statewide mutual-aid pact.
  4. Assisting in regional mutual-aid pact.
  5. Assisting in a national multistate or multiagency response.

**SINGLE RESOURCE (cont'd)**

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- CO responsibilities.
  - Understand your dispatch assignment.
    - Location.
    - Equipment and communications requirements.
    - Check-in location or person.
    - Response routing problems.
    - Personnel accountability.
    - Follow your local protocols.

Slide 3-31

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C. CO responsibilities.

1. Understand your dispatch assignment.
  - a. Location at which the resource will be working.
  - b. Equipment and communications requirements for their assignment.
  - c. The person or location they are to check in with.
  - d. Response routing problems, such as closed roads or traffic congestion.
  - e. Personnel accountability.
  - f. Follow your local protocols.

**SINGLE RESOURCE (cont'd)**

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- Additional items if deployed out of your area.
  - Length of stay.
  - Financial requirements.
  - Personnel medical requirements.
  - Transportation requirements.
  - Use/Reimbursement of expendables.

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2. Additional items to consider if deployed out of your area.
  - a. Length of stay. Could be up to 14, 21 or 30 days on long-term assignments.
  - b. Financial requirements. May initially need money for food, fuel lodging for an extended time. Once logistics is established, they will commence taking care of the resources assigned to the incident.
  - c. Personnel medical requirements, such as prescriptions.
  - d. Transportation requirements (e.g., drive, fly or send engine on another truck?).

- e. Use/Reimbursement of expendable items needed to complete your assignments.

**SINGLE RESOURCE (cont'd)**

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- Upon arrival out of your area.
  - Check in at designated check-in point.
  - Inventory equipment.
  - Obtain radio frequency list.
  - Program your radios accordingly.
  - Obtain area maps.
  - Obtain information on the incident.

Slide 3-33

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- 3. Upon arrival out of your area.
  - a. Check in at designated check-in point.
  - b. Inventory equipment. It is always good for any responding apparatus to have a complete listing of its inventory.
  - c. Obtain radio frequency list.
  - d. Program your radios accordingly. If you cannot prior to dispatch, work through the incident's Logistical Section, specifically the Communication Unit Leader to get your radios compatible.
  - e. Obtain area maps. This can usually be done through the IC, OSC, automobile club, or a realtor's office.
  - f. Obtain information on the incident, such as situational awareness (from the Situation Unit Leader or PSC).

### SINGLE RESOURCE (cont'd)

- Understand your assignment.
  - Don't take on an assignment with which you are not familiar.
  - Stay with your assigned crew, Strike Team or Task Force.
  - Keep in communications with your assigned leader.

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4. Understand your assignment.
  - a. Do not take on an assignment with which you are not familiar. Remember, if the assignment is against your department's policies, unsafe, or you do not have the training or equipment to complete it, let your supervisor know that this will be an unsafe assignment for you to undertake.
  - b. Stay with your assigned crew, Strike Team or Task Force.
  - c. Keep in communications with your assigned leader.

### SINGLE RESOURCE (cont'd)

- Keep records of your personnel's actions and time using ICS Form 214, Activity Log (Unit Log).
- Turn in your logs when requested, but keep a copy.

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- d. Keep records of your personnel's actions and time using ICS Form 214, Activity Log (Unit Log) and crew timesheets.
- e. Turn in your logs when requested, but keep a copy for yourself.

VI. STRIKE TEAM/TASK FORCE LEADER

**STRIKE TEAM/TASK FORCE LEADER**

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- Definition of Strike Team.
  - Usually three to five single resources assigned.
  - Must operate within the span of control.
  - Must be the **same** kind and type (e.g., all Type 6 Engines).
  - Must have common communications capabilities.
  - Must have a leader.

Slide 3-36

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A. Definition of Strike Team.

1. Usually three to five single resources assigned, within the span of control.
2. Must operate within the span of control.
3. Must be the **same** kind and type (e.g., all Type 6 Engines). Strike and same both start with “s.”
4. Must have common communications capabilities.
5. Must have a leader, referred to as Strike Team Leader.

**STRIKE TEAM/TASK FORCE LEADER (cont'd)**

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- Definition of Task Force.
  - Any combination of single resources.
  - Must operate within the span of control.
  - May be of **different** kind and type (e.g., engines, tenders, ambulances).
  - Must have common communications capabilities.
  - Must have a leader.

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B. Definition of Task Force.

1. Any combination of single resources in the span of control, typically three to five resources.
2. Must operate within the span of control.
3. May be of **different** kind and type. (i.e., engines, tenders, ambulances all working together on an assignment).
4. Must have common communications capabilities.
5. Must have a leader, referred to as a Task Force Leader.

**STRIKE TEAM/TASK FORCE  
LEADER (cont'd)**

- Strike Team Leader and Task Force Leader's responsibilities.
  - May be operating in unfamiliar territory.
  - In charge of the lives of approximately 25 personnel or more.
  - In charge of millions of dollars of equipment.
  - Possibly protecting high-value property.
  - A much bigger link in the chain.

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- C. Strike Team Leader or Task Force Leader's responsibilities.
1. May be operating in unfamiliar territory.
  2. In charge of the lives of approximately 25 personnel or more.
  3. In charge of millions of dollars of equipment.
  4. Possibly protecting high-value property.
  5. A much bigger link in the chain.

**STRIKE TEAM/TASK FORCE LEADER (cont'd)**

- CO responsibilities.
  - Understand your assignment.
    - Don't take on an assignment with which you are not familiar or capable.
    - Stay with your assigned Strike Team or Task Force.
    - Keep in communications with your supervisor.
    - Keep records of your personnel's actions and time using ICS Form 214, Activity Log (Unit Log).
    - Turn in your logs when requested, but keep a copy.

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6. As an Strike Team Leader or Task Force Leader, understand your assignment.
  - a. Do not take on an assignment with which you are not familiar or capable. Other people depend on you.
  - b. Stay with your assigned Strike Team or Task Force.
  - c. Keep in communications with your supervisor, usually Division or Group Supervisor.
  - d. Keep records of your personnel's actions and time using ICS Form 214, Activity Log (Unit Log) and timesheets, equipment logs, etc.
  - e. Turn in your logs when requested, but keep a copy.

**VII. OTHER COMMAND SITUATIONS**

**OTHER COMMAND SITUATIONS**

- Unified Command (UC).
- Area Command.
- Complex Command.

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- A. Depending on the size of the fire or number of fires, Command may be organized in the following organization forms:
  - 1. Unified Command (UC).
  - 2. Area Command.
  - 3. Complex Command.
- B. UC.
  - 1. Command shared by representatives of agencies involved; agencies from jurisdictional boundaries, if applicable; or agencies from local, state or federal responders, if applicable.
  - 2. Work collectively to fulfill common objectives.
  - 3. May be at single Command level, at area Command level, or Complex Command level.
- C. Area Command.
  - 1. Multiple incidents in close proximate geographical location to each other.
  - 2. Individually, incidents are each managed by a separate Incident Management Team (IMT).
  - 3. Provides for common overall direction required.
  - 4. Resolves possible conflicts between incidents.
  - 5. Does not have an Operations section. Operations is left to the IMTs to manage their own operational issues and concerns.
  - 6. Area Command will also be the manager of all critical resources assigned to the incidents within its responsibility.
- D. Complex Command.
  - 1. Multiple small/large incidents within close proximity to each other.
  - 2. Individual incidents usually not big enough for individual ICS.
  - 3. All are managed by a single IMT.
  - 4. May have characteristics of UC.

- a. Various agencies have authority for individual incidents.
- b. Incidents are not under individual Command but may be Branches or Divisions or Operations under Complex Command.

**VIII. WILDLAND TYPING SYSTEM**

**WILDLAND TYPING SYSTEM**

- Kinds of resources:
  - Engine.
- Types of resources:
  - Size.
  - Capacity.
  - Skill level.
    - For example, Type 3 Engine.



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- A. Resource categorization.
  - 1. Kinds of resources.
    - a. What the resource is.
    - b. Engine, truck, dozer, helicopter, crew, ambulance, police car, IMT overhead personnel.
  - 2. Types of resources.
    - a. Size, capability, skill level, capacity, etc.
    - b. Type 3 IC, Type 1 Engine, Type 2 Dozer, Type 1 Helicopter.

## WILDLAND TYPING SYSTEM (cont'd)

### Engines

Components	Structure Engines		Wildland Engines				
	1	2	3	4	5	6	7
Type	1	2	3	4	5	6	7
Gallons per minute (gpm)	1,000+	250+	150	50	50	30	10
Pressure	150	150	250	100	100	100	100
Tank Capacity	400+	400+	500+	750+	400-750	150-400	50-200
2 1/2" Hose	1,200+	1,000	-	-	-	-	-
1 1/2" Hose	400	500	500	300	300	300	-
1" Hose	-	-	500	300	300	300	200
Ladders	48'	48'	-	-	-	-	-
Master Stream	500 gpm	-	-	-	-	-	-
Minimum Personnel	4	3	3	2	2	2	2

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### B. Engines.

## WILDLAND TYPING SYSTEM (cont'd)

### Crews for National Mobilization

Standards	Type 1	Type 2 w/IA Capability	Type 2	Type 3
Training	80 Hours Annually	FFT1 and Refresher	FFT1 and Refresher	FFT1 and Refresher
Fitness	Arduous	Arduous	Arduous	Arduous
Logistics	Self-sufficient	Not Self-sufficient	Not Self-sufficient	Not Self-sufficient
Dispatch	1 Hour Response	Variable	Variable	Variable
Transportation	Within Crew	Need	Need	Need
Tools and Equipment	Fully Equipped	Not Equipped	Not Equipped	Not Equipped
Personal Gear and PPE	Arrives Equipped	Arrives Equipped	Arrives Equipped	Arrives Equipped

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### C. Crews for national mobilization.

## WILDLAND TYPING SYSTEM (cont'd)

- Interagency hotshot crews.
  - Exceed Type 1 crew standards.
  - National interagency resource.
  - Permanent supervision.
  - Work and/or train together 40 hours per week.



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- D. Interagency hotshot crews.
  - 1. Exceed Type 1 crew standards.
  - 2. National interagency resource.
  - 3. Permanent supervision.
  - 4. Work and/or train together 40 hours per week.

**INCIDENT TYPES**

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- Type 5 — initial attack.
- Type 4 — initial attack.
- Type 3 — extended attack.
- Type 2 — extended attack.
- Type 1 — extended attack.

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- E. Incident types. The National Incident Management System (NIMS) has defined incident types into five categories outlined below, along with their common characteristics.
  - 1. Type 5 — initial attack.
    - a. Usually just one single resource.
    - b. Limited to one operational period.
    - c. Normally does not require a written Incident Action Plan (IAP).
    - d. IC is usually the responding CO.
  - 2. Type 4 — initial attack.
    - a. More than one single resource.
      - Engine(s) and tender(s).
      - Possibility of Strike Team response.
    - b. Limited to one operational period.

- c. Normally does not require a written IAP.
  - d. IC may be the responding CO and handles all Command positions.
- 3. Type 3 — extended attack.
  - a. Multiple single resources.
  - b. Expanded span of control.
  - c. IC has no other responsibilities.
  - d. Use of ICS Form 201, Incident Briefing Form, commonly the beginning of an IAP, and other ICS forms as well.
  - e. The need to develop incident Divisions.
- 4. Type 2 — extended attack.
  - a. Multiple single resources, Strike Teams, etc.
  - b. Greatly expanded span of control.
  - c. Section chiefs required.
  - d. Division supervisors required.
  - e. IC has no other responsibilities.
  - f. Use of full IAP and other ICS forms as well.
- 5. Type 1 — extended attack.
  - a. All Command positions filled by Type 1 qualified people. This team is often referred to as the “Overhead Team.”
  - b. Multiple Divisions and/or Groups.
  - c. May require Branches.
  - d. Excess of 500 personnel per operational period.
  - e. Use of air operations with several aircraft.
  - f. Use of full IAP and other ICS forms as well.

**IX. INCIDENT COMMAND SYSTEM FORMS**

**ICS FORMS**

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- Series of forms used within the ICS.
  - Many will be advantageous to local operations.
  - Each form is specific to its use.
  - Forms are numbered and named.
  - If followed, can simplify paperwork and incident organization.
  - Can be helpful on a day-to-day basis.

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- A. Series of forms used within the ICS.
1. Many will be advantageous to local operations.
  2. Each form is specific to its use.
  3. Forms are numbered and named.
  4. Following the forms can simplify paperwork and incident organization.
  5. They can be helpful on a day-to-day basis. ICS Form 201 is an excellent way to record any incident. The information can be used to fill out National Fire Incident Reporting System (NFIRS) reports.

**ICS FORMS (cont'd)**

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- Forms that the CO should be familiar with.
  - ICS Form 201, Incident Briefing.
  - ICS Form 214, Activity Log.
  - ICS Form 202, Incident Operations (Action Plan).
  - ICS Form 203, Organizational Assignment List.
  - ICS Form 204, Assignment List.
  - ICS Form 205, Radio Communications Plan.
  - ICS Form 206, Medical Plan.
  - ICS Form 213, General Message.

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- B. The following are some ICS forms that the CO should be familiar with:

1. ICS Form 201, Incident Briefing.
2. ICS Form 214, Activity Log.
3. ICS Form 202, Incident Objectives (Action Plan).
4. ICS Form 203, Organizational Assignment List.
5. ICS Form 204, Assignment List.
6. ICS Form 205, Incident Radio Communications Plan.
7. ICS Form 206, Medical Plan.
8. ICS Form 213, General Message.

**ICS FORM 201,  
INCIDENT BRIEFING**

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- Provide information to oncoming IC during change of command.
- Excellent way to organize any incident.
- May be used in all incident types.
- Start early.
- Appoint a scribe if available.

Slide 3-48

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C. ICS Form 201, Incident Briefing.

1. The main purpose of this form is to provide information to oncoming ICs during the change of command.
2. This form is also an excellent way to organize any incident and ensure IC covers responsibilities.
3. It may be used in all incident types.
4. Start using the form early, or otherwise it is hard to catch up.
5. Appoint a scribe if available.

**ICS FORM 201,  
INCIDENT BRIEFING (cont'd)**

- Different styles available for same purpose.
- Contains four pages.
- Separate pages to give to other ICS sections.

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6. There are different styles available for the same purpose.
7. The form contains four pages:
  - a. Page 1 contains a blank area to sketch the incident and list health and safety hazards.
  - b. Page 2 contains an area to list objectives and log actions.
  - c. Page 3 contains an area to draw an organizational chart.
  - d. Page 4 contains an area to record requested resources, estimated time of arrival (ETA), arrival, and assignment.
8. As the incident grows and there is a need for a full IAP completed by other ICS positions, the form pages may be separated and given to other ICS sections for work-up of their needed information on the other forms in the full IAP.

**ICS FORM 214,  
ACTIVITY LOG**

- Keep track of personnel and activities.
  - Section for basic assignment information.
  - Section for roster of personnel.
  - Section for logging event action and time.
- Important for structural CO.
- “Time card” for you, your personnel and equipment.
- Keep a copy.

Slide 3-50

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D. ICS Form 214, Activity Log (Unit Log).

1. This form is used to keep track of personnel and activities.
2. It is a very important form for structural COs.
3. This is a “time card” for structural COs, their personnel and their equipment.
4. Remember to keep a copy.

<b>ICS FORM 202, INCIDENT OBJECTIVES</b>
<ul style="list-style-type: none"><li>• Usually part of a group of forms.</li><li>• Helps initial IC organize thoughts into a plan.</li><li>• A periodic status review during the incident will assist in continual size-up of the incident.</li><li>• Part of the information to be turned over to an oncoming IC.</li></ul>
<small>Slide 3-51</small>

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E. ICS Form 202, Incident Objectives.

1. This form is usually part of a group of forms created by the Command and General Staff on large incidents.
2. It is very handy for the initial IC to help organize thoughts into a plan.
3. A periodic status review during the incident will assist in continual size-up of the incident.
4. Part of the information will be turned over to an oncoming IC.

**ICS FORM 203, ORGANIZATIONAL ASSIGNMENT LIST**

- Keeps track of supervisors.
- Maintains Unity of Command.
- Used to maintain span of control.
- Used to address how operational assignments are divided.

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- F. ICS Form 203, Organizational Assignment List.
1. Keeps track of supervisors assigned for that particular operational period.
  2. Maintains the concept of Unity of Command.
  3. Used to maintain span of control.
  4. Used to address how the operational assignments are divided: Branches, Divisions, Groups and Staging Areas.

**ICS FORM 204, ASSIGNMENT LIST**

- Usually part of a group of forms.
- Very handy for Initial IC to help keep track of where single resources are assigned.
- Provides needed work assignment information, radio frequencies, and other units assigned to work area.

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- G. ICS Form 204, Assignment List.
1. This form is usually part of a group of forms created by the Command and General Staff on large incidents.
  2. It is very handy for the initial IC to help keep track of where single resources are assigned.

3. Provides needed work assignment information, radio frequencies, and other units assigned to work area.

**ICS FORM 205, INCIDENT RADIO COMMUNICATIONS PLAN**

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- Usually created by the Communications Unit during large incidents.
- Helps the CO as the initial IC to keep track of the various radio frequencies used by responding agencies.
- Part of the information to be turned over to an oncoming IC.

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H. ICS Form 205, Incident Radio Communications Plan.

1. This form is usually created by the Communications Unit during large incidents.
2. It helps the CO as the initial IC to keep track of the various radio frequencies used by responding agencies.
3. Part of the information will be turned over to an oncoming IC.

**ICS FORM 206, MEDICAL PLAN**

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- Ensures that first responders have a plan to take care of medical needs.
- Ensures that all personnel understand communications.
- Lists incident ambulances, medivac helicopters, etc.
- Must be signed by Medical Unit Leader and the Safety Officer.

Slide 3-55

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I. ICS Form 206, Medical Plan.

1. Used to ensure that first responders have a plan to take care of their medical needs, if a condition arises.

2. Used to ensure that all personnel on the incident understand the communications link and who needs to be notified when a responder is injured.
3. Lists incident ambulances, medivac helicopters or aircraft, medical aid stations, hospitals, clinics, burn centers, hyperbaric chambers, travel by ground or air, etc.
4. This form must be signed by the Medical Unit Leader and the Safety Officer to ensure it is complete and safe.

**ICS FORM 213,  
GENERAL MESSAGE**

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- Basic letter or note form.
- Provides a written record document.
- Three parts.
  - One part saved by sender for record.
  - Two parts sent to receiving party.
  - Receiving party writes in its answer, keeps a copy, and returns the last copy to the original sender.

Slide 3-56

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J. ICS Form 213, General Message.

1. This is a basic letter or note form.
2. It provides a written record document.
3. This form has three parts:
  - a. One part is saved by sender for record.
  - b. Two parts are sent to the receiving party.
  - c. The receiving party writes its answer, keeps a copy for its records, and returns the last copy to the original sender.

X. RADIO COMMUNICATIONS

**RADIO COMMUNICATIONS**

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- Communications may not be handled in the same manner that the structural CO is used to.
  - If responding to a mutual-aid situation, work within your parameters.
  - Make sure communications procedures are understood and followed.
  - Federal and many state agencies follow specific ICS guidelines.

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- A. Communications may not be handled in the same manner that the structural CO is used to.
1. If responding to a mutual-aid situation, work within your parameters.
  2. Make sure communications procedures are understood and followed.
  3. Federal and many state agencies follow specific ICS guidelines.

**RADIO COMMUNICATIONS**  
**(cont'd)**

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- Stay on your assigned frequency.
- Do not scan. Use another radio.
- Receive Continuous Tone-Coded Squelch System (CTCSS) should be turned **off**.



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- B. Stay on your assigned frequency.
- C. Do not scan. Use another radio.
- D. Receive Continuous Tone-Coded Squelch System (CTCSS) should be turned **off**.

**RADIO COMMUNICATIONS**  
**(cont'd)**

- Some mutual-aid areas have created a color code system.
  - Red — fire frequencies.
  - White — medical frequencies.
  - Blue — law enforcement frequencies.
  - Green — incident command frequencies.

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E. Response frequencies.

1. Some mutual-aid areas have created a color code system.
  - a. Red — fire frequencies.
  - b. White — medical frequencies.
  - c. Blue — law enforcement frequencies.
  - d. Green — incident command frequencies.

**RADIO COMMUNICATIONS**  
**(cont'd)**

- Response frequencies are called by color and number.
  - Dispatch might transmit, “Respond on Red 1.”
  - This could be Channel 1 on one agency’s radio and Channel 6 on another; however, they are both the same frequency, 154.280.

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2. Response frequencies are called by color and number.
  - a. Dispatch might transmit, “Respond on Red 1.”
  - b. This could be Channel 1 on one agency’s radio and Channel 6 on another; however, they are both the same frequency, 154.280.

## RADIO COMMUNICATIONS (cont'd)

- Plain text communications.
  - Use correct wording.
    - No “10-Codes” or “signals.”
    - “En route” versus “Responding.”
    - “Affirmative” and “Negative.”
    - “At scene” or “On-scene.”
    - “Available at ...”
    - “In service” or “Out of service at ...”

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### F. Plain text communications.

1. Use correct wording.
  - a. No “10-codes” or “signals.”
  - b. “En route” versus “responding.”
  - c. “Affirmative” and “negative.”
  - d. “At scene” or “on-scene.”
  - e. “Available at ...”
  - f. “In service” or “out of service at ...”

## RADIO COMMUNICATIONS (cont'd)

- Use correct equipment terminology.
  - “Engine” not “pumper.”
  - “Tankers” fly.
  - “Tenders” operate on the ground.



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2. Use correct equipment terminology.

- a. “Engine” not “pumper.”
- b. “Tankers” fly.
- c. “Tenders” operate on the ground.

## ACTIVITY 3.1

### Initial Attack Command

#### Purpose

Given a wildland fire scenario, size-up and take command of the incident.



#### Directions

1. The class will be divided into groups of two.
2. Each group will act as the structural CO of the first-arriving resource.
3. Using ICS Form 201 provided in the appendix, take command of the incident and organize it.
4. You will be provided with additional resources. Do not “invent” resources.
5. Complete ICS Form 201 as other resources are dispatched or arrive on-scene.
6. At the end of the activity, save your work. It will be used in future activities.



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**XI. SUMMARY**



## SUMMARY

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- Command and control.
- Initial attack.
- Extended attack.
- Change of command.
- Single resource.
- Strike Team Leader/Task Force Leader.
- Other Command situations.

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## SUMMARY (cont'd)

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- Wildland typing system.
- ICS forms.
- Radio communications.

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# APPENDIX

## ICS FORMS

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## CONTENTS

The appendix contains the following materials:

- ICS 201, Incident Briefing.
- ICS 204, Assignment List.
- ICS 205, Incident Radio Communications Plan.
- ICS 214, Activity Log.

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**INCIDENT BRIEFING (ICS 201)**

<b>1. Incident Name:</b>	<b>2. Incident Number:</b>	<b>3. Date/Time Initiated:</b> Date: _____ Time: _____
<b>9. Current Organization</b> (fill in additional organization as appropriate):		
<pre> graph TD     IC[Incident Commander(s)] --- LO[Liaison Officer]     IC --- SO[Safety Officer]     IC --- PIO[Public Information Officer]     IC --- PSC[Planning Section Chief]     IC --- OSC[Operations Section Chief]     IC --- LSC[Logistics Section Chief]     IC --- FASC[Finance / Admin. Section Chief]         </pre>		
<b>6. Prepared by:</b> Name: _____ Position/Title: _____ Signature: _____		
<b>ICS 201, Page 3</b>	Date/Time: _____	

**INCIDENT BRIEFING (ICS 201)**

<b>1. Incident Name:</b>		<b>2. Incident Number:</b>		<b>3. Date/Time Initiated:</b> Date: _____ Time: _____	
<b>10. Resource Summary:</b>					
Resource	Resource Identifier	Date/Time Ordered	ETA	Arrived	Notes (location/assignment/status)
				<input type="checkbox"/>	
				<input type="checkbox"/>	
				<input type="checkbox"/>	
				<input type="checkbox"/>	
				<input type="checkbox"/>	
				<input type="checkbox"/>	
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				<input type="checkbox"/>	
<b>6. Prepared by:</b> Name: _____ Position/Title: _____ Signature: _____					
<b>ICS 201, Page 4</b>			Date/Time: _____		

## INCIDENT BRIEFING (ICS 201)

**Purpose.** The Incident Briefing (ICS 201) provides the Incident Commander (and the Command and General Staffs) with basic information regarding the incident situation and the resources allocated to the incident. In addition to a briefing document, the ICS 201 also serves as an initial action worksheet. It serves as a permanent record of the initial response to the incident.

**Preparation.** The briefing form is prepared by the Incident Commander for presentation to the incoming Incident Commander along with a more detailed oral briefing.

**Distribution.** Ideally, the ICS 201 is duplicated and distributed before the initial briefing of the Command and General Staffs or other responders as appropriate. The “Map/Sketch” and “Current and Planned Actions, Strategies, and Tactics” sections (pages 1–2) of the briefing form are given to the Situation Unit, while the “Current Organization” and “Resource Summary” sections (pages 3–4) are given to the Resources Unit.

**Notes:**

- The ICS 201 can serve as part of the initial Incident Action Plan (IAP).
- If additional pages are needed for any form page, use a blank ICS 201 and repaginate as needed.

Block Number	Block Title	Instructions
1	<b>Incident Name</b>	Enter the name assigned to the incident.
2	<b>Incident Number</b>	Enter the number assigned to the incident.
3	<b>Date/Time Initiated</b> • Date, Time	Enter date initiated (month/day/year) and time initiated (using the 24-hour clock).
4	<b>Map/Sketch</b> (include sketch, showing the total area of operations, the incident site/area, impacted and threatened areas, overflight results, trajectories, impacted shorelines, or other graphics depicting situational status and resource assignment)	Show perimeter and other graphics depicting situational status, resource assignments, incident facilities, and other special information on a map/sketch or with attached maps. Utilize commonly accepted ICS map symbology.  If specific geospatial reference points are needed about the incident’s location or area outside the ICS organization at the incident, that information should be submitted on the Incident Status Summary (ICS 209).
5	<b>Situation Summary and Health and Safety Briefing</b> (for briefings or transfer of command): Recognize potential incident Health and Safety Hazards and develop necessary measures (remove hazard, provide personal protective equipment, warn people of the hazard) to protect responders from those hazards.	Self-explanatory.

**COMMAND AND CONTROL ISSUES OF THE WILDLAND URBAN INTERFACE**

<b>Block Number</b>	<b>Block Title</b>	<b>Instructions</b>
<b>6</b>	<b>Prepared by</b> <ul style="list-style-type: none"> <li>• Name</li> <li>• Position/Title</li> <li>• Signature</li> <li>• Date/Time</li> </ul>	Enter the name, ICS position/title, and signature of the person preparing the form. Enter date (month/day/year) and time prepared (24-hour clock).
<b>7</b>	<b>Current and Planned Objectives</b>	Enter the objectives used on the incident and note any specific problem areas.
<b>8</b>	<b>Current and Planned Actions, Strategies, and Tactics</b> <ul style="list-style-type: none"> <li>• Time</li> <li>• Actions</li> </ul>	Enter the current and planned actions, strategies, and tactics and time they may or did occur to attain the objectives. If additional pages are needed, use a blank sheet or another ICS 201 (Page 2), and adjust page numbers accordingly.
<b>9</b>	<b>Current Organization</b> (fill in additional organization as appropriate) <ul style="list-style-type: none"> <li>• Incident Commander(s)</li> <li>• Liaison Officer</li> <li>• Safety Officer</li> <li>• Public Information Officer</li> <li>• Planning Section Chief</li> <li>• Operations Section Chief</li> <li>• Finance/Administration Section Chief</li> <li>• Logistics Section Chief</li> </ul>	<ul style="list-style-type: none"> <li>• Enter on the organization chart the names of the individuals assigned to each position.</li> <li>• Modify the chart as necessary, and add any lines/spaces needed for Command Staff Assistants, Agency Representatives, and the organization of each of the General Staff Sections.</li> <li>• If Unified Command is being used, split the Incident Commander box.</li> <li>• Indicate agency for each of the Incident Commanders listed if Unified Command is being used.</li> </ul>
<b>10</b>	<b>Resource Summary</b>	Enter the following information about the resources allocated to the incident. If additional pages are needed, use a blank sheet or another ICS 201 (Page 4), and adjust page numbers accordingly.
	• Resource	Enter the number and appropriate category, kind, or type of resource ordered.
	Resource Identifier	Enter the relevant agency designator and/or resource designator (if any).
	• Date/Time Ordered	Enter the date (month/day/year) and time (24-hour clock) the resource was ordered.
	• ETA	Enter the estimated time of arrival (ETA) to the incident (use 24-hour clock).
	• Arrived	Enter an "X" or a checkmark upon arrival to the incident.
	• Notes (location/ assignment/status)	Enter notes such as the assigned location of the resource and/or the actual assignment and status.

**ASSIGNMENT LIST (ICS 204)**

<b>1. Incident Name:</b>		<b>2. Operational Period:</b> Date From: _____ Date To: _____ Time From: _____ Time To: _____		<b>3.</b> <b>Branch:</b>  <b>Division:</b>  <b>Group:</b>  <b>Staging Area:</b>	
<b>4. Operations Personnel:</b> <u>Name</u> _____ <u>Contact Number(s)</u> _____					
Operations Section Chief: _____					
Branch Director: _____					
Division/Group Supervisor: _____					
<b>5. Resources Assigned:</b>				Reporting Location, Special Equipment and Supplies, Remarks, Notes, Information	
Resource Identifier	Leader	# of Persons	Contact (e.g., phone, pager, radio frequency, etc.)		
<b>6. Work Assignments:</b>					
<b>7. Special Instructions:</b>					
<b>8. Communications</b> (radio and/or phone contact numbers needed for this assignment): Name/Function _____ Primary Contact: indicate cell, pager, or radio (frequency/system/channel) _____/_____ _____/_____ _____/_____					
<b>9. Prepared by:</b> Name: _____ Position/Title: _____ Signature: _____					
<b>ICS 204</b>		<b>IAP Page</b> _____		Date/Time: _____	

## **ASSIGNMENT LIST (ICS 204)**

**Purpose.** The Assignment List(s) (ICS 204) informs Division and Group supervisors of incident assignments. Once the Command and General Staffs agree to the assignments, the assignment information is given to the appropriate Divisions and Groups.

**Preparation.** The ICS 204 is normally prepared by the Resources Unit, using guidance from the Incident Objectives (ICS 202), Operational Planning Worksheet (ICS 215), and the Operations Section Chief. It must be approved by the Incident Commander, but may be reviewed and initialed by the Planning Section Chief and Operations Section Chief as well.

**Distribution.** The ICS 204 is duplicated and attached to the ICS 202 and given to all recipients as part of the Incident Action Plan (IAP). In some cases, assignments may be communicated via radio/telephone/fax. All completed original forms must be given to the Documentation Unit.

**Notes:**

- The ICS 204 details assignments at Division and Group levels and is part of the IAP.
- Multiple pages/copies can be used if needed.
- If additional pages are needed, use a blank ICS 204 and repaginate as needed.

Block Number	Block Title	Instructions
<b>1</b>	<b>Incident Name</b>	Enter the name assigned to the incident.
<b>2</b>	<b>Operational Period</b> <ul style="list-style-type: none"> <li>• Date and Time From</li> <li>• Date and Time To</li> </ul>	Enter the start date (month/day/year) and time (using the 24-hour clock) and end date and time for the operational period to which the form applies.
<b>3</b>	<b>Branch</b> <b>Division</b> <b>Group</b> <b>Staging Area</b>	This block is for use in a large IAP for reference only.  Write the alphanumeric abbreviation for the Branch, Division, Group, and Staging Area (e.g., "Branch 1," "Division D," "Group 1A") in large letters for easy referencing.
<b>4</b>	<b>Operations Personnel</b> <ul style="list-style-type: none"> <li>• Name, Contact Number(s)</li> <li>– Operations Section Chief</li> <li>– Branch Director</li> <li>– Division/Group Supervisor</li> </ul>	Enter the name and contact numbers of the Operations Section Chief, applicable Branch Director(s), and Division/Group Supervisor(s).

**COMMAND AND CONTROL ISSUES OF THE WILDLAND URBAN INTERFACE**

<b>Block Number</b>	<b>Block Title</b>	<b>Instructions</b>
<b>5</b>	<b>Resources Assigned</b>	Enter the following information about the resources assigned to the Division or Group for
	<ul style="list-style-type: none"> <li>• Resource Identifier</li> </ul>	The identifier is a unique way to identify a resource (e.g., ENG-13, IA-SCC-413). If the resource has been ordered but no identification has been received, use TBD (to be determined).
	<ul style="list-style-type: none"> <li>• Leader</li> </ul>	Enter resource leader's name.
	<ul style="list-style-type: none"> <li>• # of Persons</li> </ul>	Enter total number of persons for the resource assigned, including the leader.
	<ul style="list-style-type: none"> <li>• Contact (e.g., phone, pager, radio frequency, etc.)</li> </ul>	Enter primary means of contacting the leader or contact person (e.g., radio, phone, pager, etc.). Be sure to include the area code when listing a phone number.
<b>5</b> (continued)	<ul style="list-style-type: none"> <li>• Reporting Location, Special Equipment and Supplies, Remarks, Notes, Information</li> </ul>	Provide special notes or directions specific to this resource. If required, add notes to indicate: (1) specific location/time where the resource should report or be dropped off/picked up; (2) special equipment and supplies that will be used or needed; (3) whether or not the resource received briefings; (4) transportation needs; or (5) other information.
<b>6</b>	<b>Work Assignments</b>	Provide a statement of the tactical objectives to be achieved within the operational period by personnel assigned to this Division or Group.
<b>7</b>	<b>Special Instructions</b>	Enter a statement noting any safety problems, specific precautions to be exercised, dropoff or pickup points, or other important information.
<b>8</b>	<b>Communications</b> (radio and/or phone contact numbers needed for this assignment) <ul style="list-style-type: none"> <li>• Name/Function</li> <li>• Primary Contact: indicate cell, pager, or radio (frequency/system/channel)</li> </ul>	<p>Enter specific communications information (including emergency numbers) for this Branch/Division/Group.</p> <p>If radios are being used, enter function (command, tactical, support, etc.), frequency, system, and channel from the Incident Radio Communications Plan (ICS 205).</p> <p>Phone and pager numbers should include the area code and any satellite phone specifics.</p> <p>In light of potential IAP distribution, use sensitivity when including cell phone number.</p> <p>Add a secondary contact (phone number or radio) if needed.</p>
<b>9</b>	<b>Prepared by</b> <ul style="list-style-type: none"> <li>• Name</li> <li>• Position/Title</li> <li>• Signature</li> <li>• Date/Time</li> </ul>	Enter the name, ICS position, and signature of the person preparing the form. Enter date (month/day/year) and time prepared (24-hour clock).

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## INCIDENT RADIO COMMUNICATIONS PLAN (ICS 205)

**Purpose.** The Incident Radio Communications Plan (ICS 205) provides information on all radio frequency or trunked radio system talkgroup assignments for each operational period. The plan is a summary of information obtained about available radio frequencies or talkgroups and the assignments of those resources by the Communications Unit Leader for use by incident responders. Information from the Incident Radio Communications Plan on frequency or talkgroup assignments is normally placed on the Assignment List (ICS 204).

**Preparation.** The ICS 205 is prepared by the Communications Unit Leader and given to the Planning Section Chief for inclusion in the Incident Action Plan.

**Distribution.** The ICS 205 is duplicated and attached to the Incident Objectives (ICS 202) and given to all recipients as part of the Incident Action Plan (IAP). All completed original forms must be given to the Documentation Unit. Information from the ICS 205 is placed on Assignment Lists.

**Notes:**

- The ICS 205 is used to provide, in one location, information on all radio frequency assignments down to the Division/Group level for each operational period.
- The ICS 205 serves as part of the IAP.

Block Number	Block Title	Instructions
1	<b>Incident Name</b>	Enter the name assigned to the incident.
2	<b>Date/Time Prepared</b>	Enter date prepared (month/day/year) and time prepared (using the 24-hour clock).
3	<b>Operational Period</b> <ul style="list-style-type: none"><li>• Date and Time From</li><li>• Date and Time To</li></ul>	Enter the start date (month/day/year) and time (using the 24-hour clock) and end date and time for the operational period to which the form applies.

**COMMAND AND CONTROL ISSUES OF THE WILDLAND URBAN INTERFACE**

<b>Block Number</b>	<b>Block Title</b>	<b>Instructions</b>
<b>4</b>	<b>Basic Radio Channel Use</b>	Enter the following information about radio channel use:
	Zone Group	
	Channel Number	Use at the Communications Unit Leader's discretion. Channel Number (Ch #) may equate to the channel number for incident radios that are programmed or cloned for a specific Communications Plan, or it may be used just as a reference line number on the ICS 205 document.
	Function	Enter the Net function each channel or talkgroup will be used for (Command, Tactical, Ground-to-Air, Air-to-Air, Support, Dispatch).
	Channel Name/Trunked Radio System Talkgroup	Enter the nomenclature or commonly used name for the channel or talk group such as the National Interoperability Channels which follow DHS frequency Field Operations Guide (FOG).
	Assignment	Enter the name of the ICS Branch/Division/Group/Section to which this channel/talkgroup will be assigned.
	RX (Receive) Frequency (N or W)	Enter the Receive Frequency (RX Freq) as the mobile or portable subscriber would be programmed using xxx.xxxx out to four decimal places, followed by an "N" designating narrowband or a "W" designating wideband emissions.  The name of the specific trunked radio system with which the talkgroup is associated may be entered across all fields on the ICS 205 normally used for conventional channel programming information.
	RX Tone/NAC	Enter the Receive Continuous Tone Coded Squelch System (CTCSS) subaudible tone (RX Tone) or Network Access Code (RX NAC) for the receive frequency as the mobile or portable subscriber would be programmed.
	TX (Transmit) Frequency (N or W)	Enter the Transmit Frequency (TX Freq) as the mobile or portable subscriber would be programmed using xxx.xxxx out to four decimal places, followed by an "N" designating narrowband or a "W" designating wideband emissions.
	TX Tone/NAC	Enter the Transmit Continuous Tone Coded Squelch System (CTCSS) subaudible tone (TX Tone) or Network Access Code (TX NAC) for the transmit frequency as the mobile or portable subscriber would be programmed.
	Mode (A, D, or M)	Enter "A" for analog operation, "D" for digital operation, or "M" for mixed mode operation.
Remarks	Enter miscellaneous information concerning repeater locations, information concerning patched channels or talkgroups using links or gateways, etc.	

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**COMMAND AND CONTROL ISSUES OF THE WILDLAND URBAN INTERFACE**

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<b>5</b>	<b>Special Instructions</b>	Enter any special instructions (e.g., using cross-band repeaters, secure-voice, encoders, private line (PL) tones, etc.) or other emergency communications needs). If needed, also include any special instructions for handling an incident within an incident.
<b>6</b>	<b>Prepared by</b> (Communications Unit Leader) Name Signature Date/Time	Enter the name and signature of the person preparing the form, typically the Communications Unit Leader. Enter date (month/day/year) and time prepared (24-hour clock).





## ACTIVITY LOG (ICS 214)

**Purpose.** The Activity Log (ICS 214) records details of notable activities at any ICS level, including single resources, equipment, Task Forces, etc. These logs provide basic incident activity documentation, and a reference for any after-action report.

**Preparation.** An ICS 214 can be initiated and maintained by personnel in various ICS positions as it is needed or appropriate. Personnel should document how relevant incident activities are occurring and progressing, or any notable events or communications.

**Distribution.** Completed ICS 214s are submitted to supervisors, who forward them to the Documentation Unit. All completed original forms must be given to the Documentation Unit, which maintains a file of all ICS 214s. It is recommended that individuals retain a copy for their own records.

**Notes:**

- The ICS 214 can be printed as a two-sided form.
- Use additional copies as continuation sheets as needed, and indicate pagination as used.

Block Number	Block Title	Instructions
1	<b>Incident Name</b>	Enter the name assigned to the incident.
2	<b>Operational Period</b> <ul style="list-style-type: none"> <li>• Date and Time From</li> <li>• Date and Time To</li> </ul>	Enter the start date (month/day/year) and time (using the 24-hour clock) and end date and time for the operational period to which the form applies.
3	<b>Name</b>	Enter the title of the organizational unit or resource designator (e.g., Facilities Unit, Safety Officer, Strike Team).
4	<b>ICS Position</b>	Enter the name and ICS position of the individual in charge of the Unit.
5	<b>Home Agency (and Unit)</b>	Enter the home agency of the individual completing the ICS 214. Enter a unit designator if utilized by the jurisdiction or discipline.
6	<b>Resources Assigned</b>	Enter the following information for resources assigned:
	<ul style="list-style-type: none"> <li>• Name</li> </ul>	Use this section to enter the resource's name. For all individuals, use at least the first initial and last name. Cell phone number for the individual can be added as an option.
	<ul style="list-style-type: none"> <li>• ICS Position</li> </ul>	Use this section to enter the resource's ICS position (e.g., Finance Section Chief).
	Home Agency (and Unit)	Use this section to enter the resource's home agency and/or unit (e.g., Des Moines Public Works Department, Water Management Unit).

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COMMAND AND CONTROL ISSUES OF THE WILDLAND URBAN INTERFACE

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Block Number	Block Title	Instructions
7	<b>Activity Log</b> <ul style="list-style-type: none"><li>• Date/Time</li><li>• Notable Activities</li></ul>	<ul style="list-style-type: none"><li>• Enter the time (24-hour clock) and briefly describe individual notable activities. Note the date as well if the operational period covers more than one day.</li><li>• Activities described may include notable occurrences or events such as task assignments, task completions, injuries, difficulties encountered, etc.</li><li>• This block can also be used to track personal work habits by adding columns such as "Action Required," "Delegated To," "Status," etc.</li></ul>
8	<b>Prepared by</b> <ul style="list-style-type: none"><li>• Name</li><li>• Position/Title</li><li>• Signature</li><li>• Date/Time</li></ul>	Enter the name, ICS position/title, and signature of the person preparing the form. Enter date (month/day/year) and time prepared (24-hour clock).

# **UNIT 4: SAFETY**

## **TERMINAL OBJECTIVE**

*The students will be able to:*



- 4.1 *Recognize and mitigate the many hazards common to working in the Wildland Urban Interface (WUI).*

## **ENABLING OBJECTIVES**

*The students will be able to:*

- 4.1 *Understand a risk versus benefit approach for operations in the WUI.*
  - 4.2 *Understand the safety considerations of the 10 Standard Firefighting Orders.*
  - 4.3 *Apply the safety considerations of the “18 Watch Out Situations.”*
  - 4.4 *Explain the safety considerations of Lookouts, Communications, Escape routes and Safety zones (LCES).*
  - 4.5 *Conduct an incident size-up, including safety considerations.*
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## UNIT 4: SAFETY

Slide 4-1

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### ENABLING OBJECTIVES

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- Understand a risk versus benefit approach for operations in the Wildland Urban Interface (WUI).
- Understand the safety considerations of the 10 Standard Firefighting Orders.
- Apply the safety considerations of the “18 Watch Out Situations.”

Slide 4-2

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### ENABLING OBJECTIVES (cont'd)

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- Explain the safety considerations of **L**ookouts, **C**ommunications, **E**scape routes and **S**afety zones (LCES).
- Conduct an incident size-up, including safety considerations.

Slide 4-3

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I. INTRODUCTION

**WUI INCIDENT PRIORITIES**

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- Life safety.
  - Firefighters.
  - Residents/Homeowners/Civilians.
- Incident stabilization.
- Property protection and conservation.
- Environmental protection.

Slide 4-4

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- A. Wildland Urban Interface (WUI) incident priorities.
1. Life safety for firefighters, civilians.
  2. Incident stabilization.
  3. Property protection and conservation.
  4. Environmental protection.
  5. As a Company Officer (CO), you shoulder the responsibility of watching out for the safety of your crew.
  6. However, residents, homeowners and civilians are a close second, way above incident stabilization or property protection.
  7. **Remember:** Everyone goes home.

**SAFETY**

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- WUI fires combine all the hazards common to wildland fires with all the hazards common to structural fires.
- Wildland firefighting, like structural firefighting, is a mix of science, art, training and experience ... all coming together in an extremely short decision time frame.

Slide 4-5

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- B. WUI — safety.
1. WUI fires combine all the hazards common to wildland fires with all the hazards common to structural fires.
    - a. WUI fires can be very infrequent, yet one can be the most significant and most memorable fire in a firefighter’s career due to the extreme conditions.
    - b. There is often a confused and frightened public to add another dimension to this hazardous environment.
  2. Wildland firefighting, like structural firefighting, is a mix of science, art, training and experience ... all coming together in an extremely short decision time frame.
    - a. Often, there is a lot happening very quickly. The time spent training for, exercising for, planning for and reviewing past related WUI incidents can pay big dividends in your role as a CO and having an accident-free experience.
    - b. How firefighters and the WUI community prepared for this event will determine the outcome.

II. RISK MANAGEMENT

**RISK MANAGEMENT**

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- Based on recognizable hazards.
- It is a situational assessment based on observed conditions.
- Training and experience.

Slide 4-6

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- A. Risk is based on recognizable hazards.
1. It is a situational assessment based on observed conditions.
  2. Do the observed conditions match your training and experience in being able to recognize risk probability and severity?

**RISK VERSUS DECISIONS**

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- All decisions are based on ability to predict fire behavior potential.
- Higher risks often taken to protect homes.
- Extreme fire behavior causes greater risks.
- Hazards require continual awareness and evaluation.

Slide 4-7

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- B. Risk versus decisions — a significant challenge for management at a WUI incident is to be able to recognize the fire behavior potential — what is going to happen. All of your operational decision-making to implement the correct strategies and tactics, and your safety, depend on this. Recognizing and mitigating all of the hazards at a WUI incident is very challenging.
1. Higher risks are often taken to protect homes beyond what would be acceptable in just a wildland fire situation — “frontal assault.”

2. Extreme fire behavior can cut off escape routes to safety zones. Mass ignition of vegetation and structures during high-wind events can create extreme radiant heat.
3. Hazardous chemicals, power lines and numerous other hazards require continual evaluation and situational awareness for firefighter safety.

**DECISION-MAKING**

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- What is the worst-case scenario?
- What will probably occur?
- What will the timing be?
- What can be done with available resources?
- Do I have a backup/contingency plan?
- When do I need to decide?
- How do I best implement?

Slide 4-8

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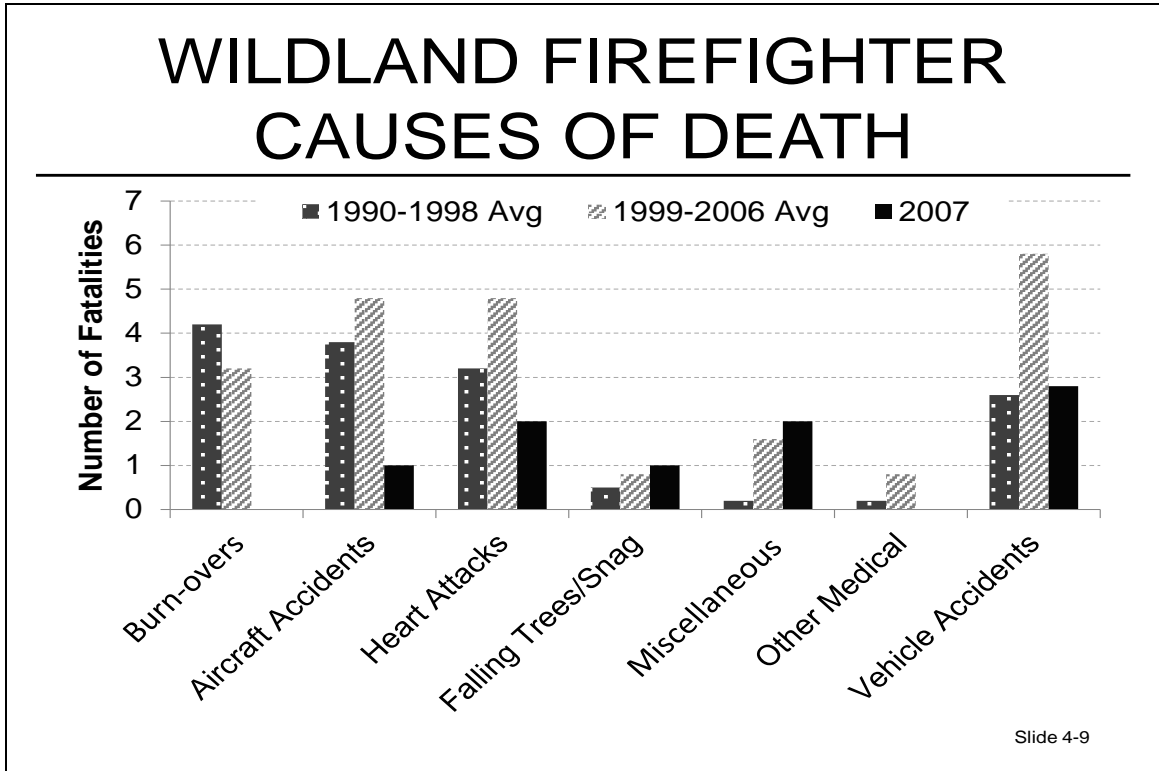
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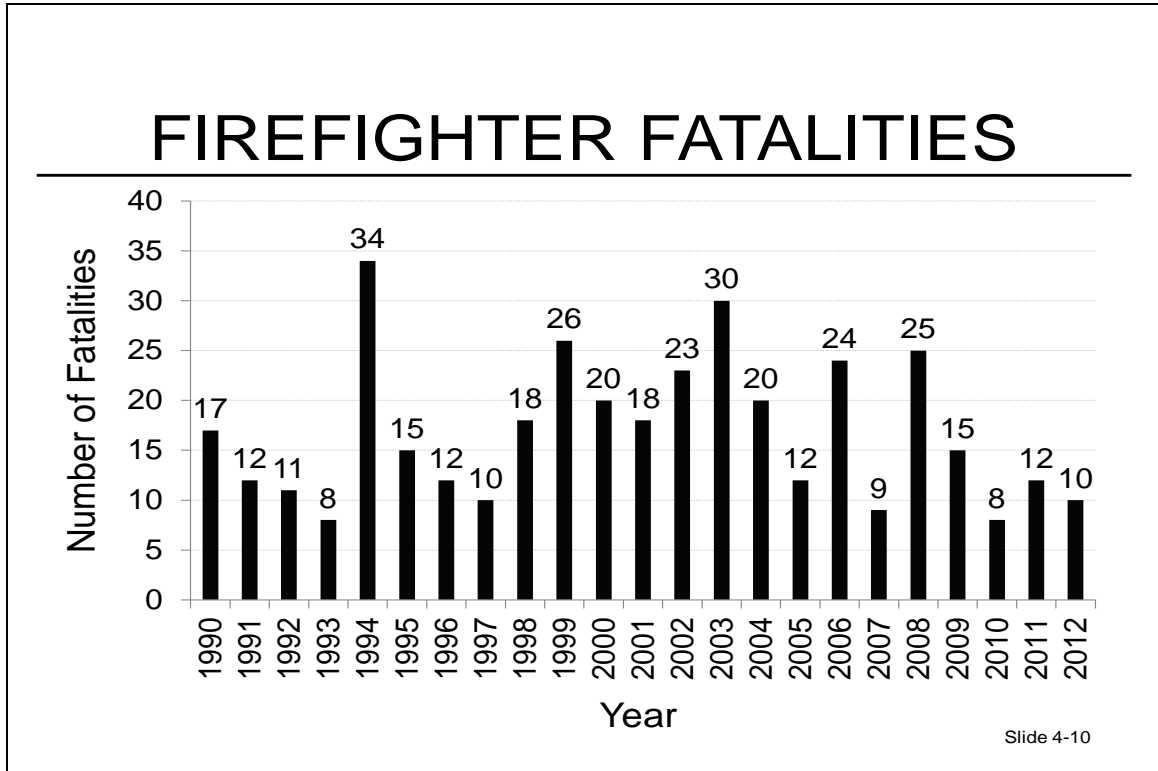
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- C. Decision-making — in the risk management process, there are questions that must be addressed.
1. What is the worst-case scenario?
  2. What will probably occur?
  3. What will the timing be?
  4. What can be done with available resources?
  5. Do I have a backup/contingency plan?
  6. When do I need to decide?
  7. How do I best implement?
  8. Continually weighing these risks versus benefits will help you make better decisions. The WUI fire ground is not a place to be overly optimistic. It is much better to be conservative and err on the side of safety.



D. The chart depicts the significant causes of wildland firefighter fatalities.



E. Firefighter fatalities.

1. Wildfire firefighting continues to be a high-risk occupation.
2. Volunteer firefighters account for more wildland fire fatalities than either paid structural firefighters or full-time wildland firefighters.

## RISK MANAGEMENT — INITIAL RESPONSE

- All fire equipment ready to go.



Slide 4-11

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### F. Initial response.

#### 1. Fire equipment.

- a. Having all of your equipment ready to go for a WUI fire assignment eliminates the stress of trying to re-equip apparatus, getting your personal equipment, organizing your personnel, and getting intelligence about the fire all at the same time. Safety is compromised when response is not orderly and systematic.
- b. Have extra fire shelters in the engines; they have been successfully deployed in the cab of trapped engines.

## PERSONAL GEAR

- Personal pack and gear ready to go.



Slide 4-12

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#### 2. Personal pack and gear.

- a. Make sure all personnel wear their full complement of personal protective equipment (PPE). Being prepared for a significant WUI event will help make you and your personnel an asset rather than a liability. Taking good care of yourself and your personnel will allow you to do a better job taking care of the fire or the affected public.

**PERSONAL PROTECTIVE EQUIPMENT**

- Hard hat.
- Eye protection.
- Neck shroud.
- Nomex.
- Gloves.
- Boots.



Slide 4-13

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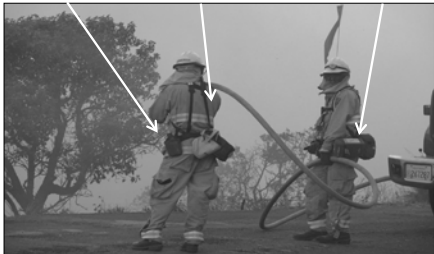
- b. Appropriate PPE consists of a combination of wildland and structural PPE. There will be times when one is more appropriate to use than the other. A combination of some wildland and some structural equipment is used at times. You should have a standard operating procedure (SOP) addressing proper PPE for WUI fires.

- Hard hat: Use a National Fire Protection Association (NFPA)/Occupational Safety and Health Administration (OSHA) approved wildland helmet or hard hat. Structural helmets are too heavy and limiting for long-duration firefighting in WUI incidents.
- Eye protection: Use goggles that provide a seal to keep wind-driven flying embers and debris out of the eyes.
- Neck shroud: Use either a hard hat neck shroud and/or high collar to avoid embers down the back of the neck. Structural fire hoods may also be worn.
- Fire-resistant shirt and pants: Use NFPA-/OSHA-approved wildland shirt and pants. Turnouts are too heavy and hot for long-duration wildland firefighting. Fire-resistant jumpsuits over cotton cloths are an acceptable alternative.

- Leather gloves: A good pair of leather work gloves with good dexterity is recommended, and they should be NFPA-/OSHA-approved.
- High-top leather boots: Use a lace-up leather 8-inch or more hiking/hunting boot that gives good ankle support in rough country.
- Full structural turnouts: If you are a structural firefighter and have the possibility of fighting a structural fire, then you need to have NFPA-/OSHA-approved structural PPE with self-contained breathing apparatus (SCBA) available.

**COMPLETE WILDLAND PPE**

- Personal protective equipment (PPE) and canteen, web gear and fire shelter.



Slide 4-14

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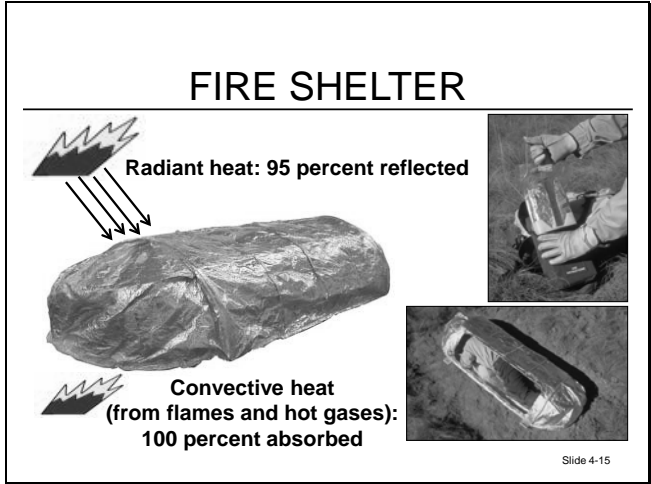
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- Additional optional items consist of web gear — small pack, canteens, fuse or flare, and dust mask.
- Switch to structural helmets and PPE if assigned to fight a structural fire. This is especially important if any interior firefighting is to take place.



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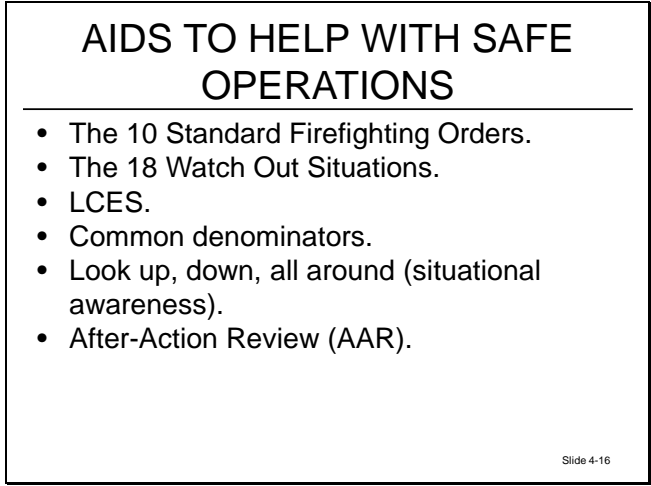
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- 3. Fire shelter.
  - a. They consist of aluminized material.
  - b. They are not standard-issue equipment for structural firefighters.
  - c. National Wildfire Coordinating Group (NWCG)/NFPA/OSHA state that it is mandatory for wildland firefighters — “fire shelter will be carried by all fireline personnel during fire suppression and prescribed fire operations, and by all fire support personnel when required to enter a fire area.”
  - d. Firefighters must know how to use this equipment and have practiced its use before entering a fire area. When time is of the essence, seconds make the difference between survival and death.

**III. AIDS TO HELP WITH SAFE OPERATIONS**



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- A. There are many programs and aids developed to help with understanding safe practices for wildland firefighters.
  - 1. The 10 Standard Firefighting Orders.
  - 2. The 18 Watch Out Situations.
  - 3. Lookouts, Communications, Escape routes and Safety zones (LCES).
  - 4. Common denominators.
  - 5. Look up, look down, look all around (situational awareness).
  - 6. After-Action Review (AAR).
- B. These are a result of the many firefighter fatalities throughout history.

**IV. THE 10 STANDARD FIREFIGHTING ORDERS**

**THE 10 STANDARD  
FIREFIGHTING ORDERS**

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- Fire behavior.
  - No. 1: Know what your fire is doing at all times.
  - No. 2: Keep informed on fire weather conditions and forecasts.
  - No. 3: Base all actions on current and expected behavior of the fire.

Slide 4-17

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- A. Background information.
  - 1. The 10 Standard Firefighting Orders came out in 1957 because of 76 firefighter deaths on wildfires in the previous 20 years.
  - 2. These fatalities included 15 California Conservation Corp firefighters on the Blackwater Fire of 1937 in Shoshone National Forest in Wyoming; 11 firefighters on the Bryant Canyon Fire of 1947 in Cleveland National Forest in California; 14 smokejumpers on the Mann Gulch Fire of 1949 in Gates of the Mountains, Montana; 15 firefighters on the Rattlesnake Fire of 1953 in Mendocino National Forest in California; and 11 hotshots on the Inaja Fire of 1956 in Cleveland National Forest in California.

3. Each of the 10 Standard Firefighting Orders is prefaced by the silent imperative “**you,**” meaning the on-the-ground firefighter, the person who is putting his or her life on the line! As the CO, you should be setting the example for safety leadership.

B. Fire behavior.

1. The first three fire orders deal with fire behavior, what firefighters will encounter when they arrive at the fire. They are:
  - a. No. 1: Know what your fire is doing at all times.
  - b. No. 2: Keep informed on fire weather conditions and forecasts.
  - c. No. 3: Base all actions on current and expected behavior of the fire.
2. It is our responsibility to seek answers to these basic questions.
  - a. What is the weather forecast?
  - b. What was the fire doing?
  - c. What is it doing now?
  - d. Where is it expected to go?
3. The correct interpretation of fire behavior will then determine your strategy of offensive or defensive and how best to confine, contain and/or control the fire.

**THE 10 STANDARD  
FIREFIGHTING ORDERS (cont'd)**

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- Fire line safety.
  - No. 4: Identify escape routes and safety zones, and make them known.
  - No. 5: Post lookouts when there is possible danger.
  - No. 6: Be alert. Keep calm. Think clearly. Act decisively.

Slide 4-18

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C. Fire line safety.

1. The next three fire orders are:
  - a. No. 4: Identify escape routes and safety zones, and make them known.
  - b. No. 5: Post lookouts when there is possible danger.
  - c. No. 6: Be alert. Keep calm. Think clearly. Act decisively.
2. After orders four and five are in place, firefighters can then become engaged. If the fire situation deteriorates, you have a plan.
3. The final five orders deal with people. You must first be clear and calm in your own mind before you can lead others. If confused, then disengage until the situation is clear to you. All of us, no matter what our experience level, will be confused and unsure of ourselves at times. There are often too many variables changing too fast for our minds to process. If confused and the fire intensity is great, disengage to your safety zone to watch and learn.

**THE 10 STANDARD  
FIREFIGHTING ORDERS (cont'd)**

- Organizational control.
  - No. 7: Maintain prompt communications with your forces, your supervisor and adjoining forces.
  - No. 8: Give clear instructions, and ensure they are understood.
  - No. 9: Maintain control of your forces at all times.

Slide 4-19

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D. Organizational control.

1. The seventh, eighth and ninth fire orders are:
  - a. No. 7: Maintain prompt communications with your forces, your supervisor and adjoining forces.
  - b. No. 8: Give clear instructions, and ensure they are understood.
  - c. No. 9: Maintain control of your forces at all times.

2. These orders go directly back to Wagner Dodge and his smokejumpers at Mann Gulch in 1949. Had the crew only listened to the foreman and his plan for an escape fire, we might not have those 14 crosses on that hillside.
3. All of us have doubts and uncertainties. The leaders on the fire must understand the situation and make sure that it is communicated in a calm and orderly manner. If your crew is unsure, then take the time to re-evaluate and bring everyone up to speed. When in doubt, ask your firefighters to repeat the instructions until you are all on the same page. Good communications are a sign of maturity. If communication lines are broken, then disengage until the lines are open again.

**THE 10 STANDARD  
FIREFIGHTING ORDERS (cont'd)**

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- Overall intent.
  - No. 10: Fight fire aggressively, having provided for safety first.

Slide 4-20

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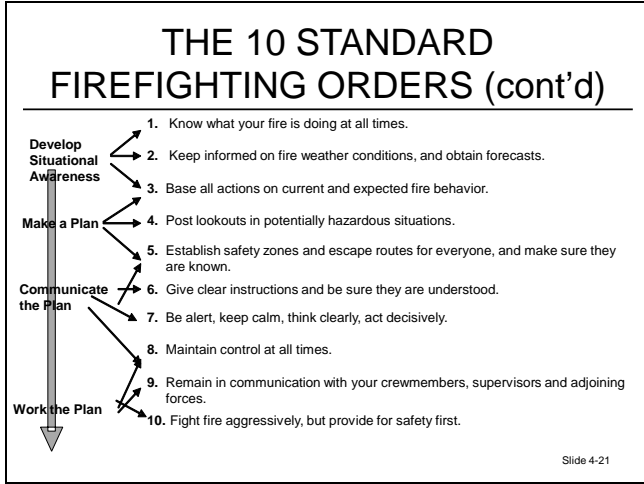
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E. Overall intent.

1. The final standard firefighting order is No. 10: fight fire aggressively, having provided for safety first.
2. We want to fight fire aggressively. We want to see the dirt fly, hoses charged and water being applied. We want to move the crew around the fire's head and cut the fire off.
3. Before we can fully engage in firefighting, we must first satisfy the 10 Standard Firefighting Orders. If a safety problem arises at any point during operations, we must start the disengagement process. Safety is written throughout the 10 Standard Firefighting Orders.
4. The tenth order was written to emphasize safety, and if it's not safe to continue, disengage until safe. Even when things are going great, be prepared to disengage if necessary.



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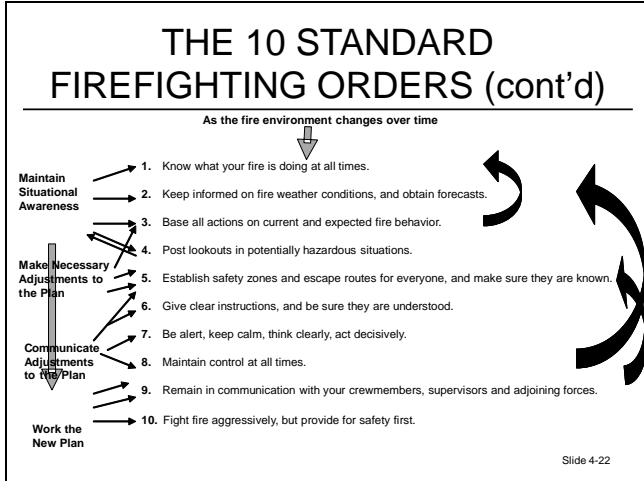
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F. Finally, the 10 Standard Firefighting Orders reviewed.

1. Know what your fire is doing at all times.
2. Keep informed on fire weather conditions, and obtain forecasts.
3. Base all actions on current and expected fire behavior.
4. Post lookouts in potentially hazardous situations.
5. Establish safety zones and escape routes for everyone, and make sure they are known.
6. Give clear instructions, and be sure they are understood.
7. Be alert, keep calm, think clearly, act decisively.
8. Maintain control at all times.
9. Remain in communication with your crewmembers, supervisors and adjoining forces.
10. Fight fire aggressively, but provide for safety first.

G. There is a logical and a rational sequence to the 10 Standard Wildland Firefighting Orders as they are written. If followed, the orders will reduce firefighter risk.




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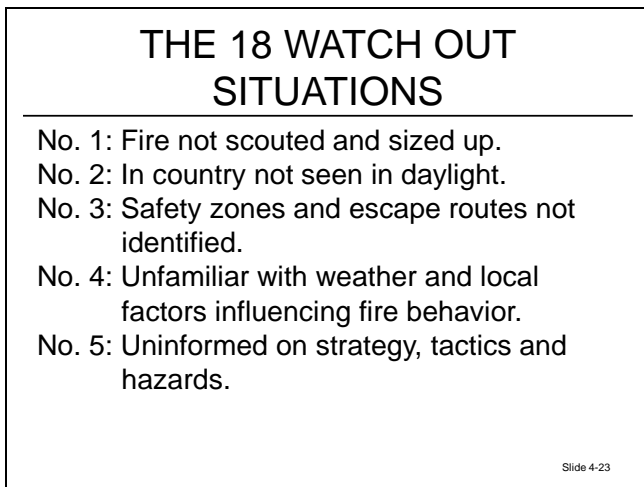
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H. The 10 Standard Wildland Firefighting Orders must become ingrained within the evaluation process of wildfire potential and situations. It is a continual process and way of thinking.

V. THE 18 WATCH OUT SITUATIONS

A. The 18 situations that shout “Watch Out” also were developed from fatalities on wildfires. They have much in common with the 10 standard orders but deal with more specific situations.




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B. The 18 Watch Out Situations are:

1. Fire not scouted and sized up.
2. In country not seen in daylight.
3. Safety zones and escape routes not identified.

- 4. Unfamiliar with weather and local factors influencing fire behavior.
- 5. Uninformed on strategy, tactics and hazards.

**THE 18 WATCH OUT SITUATIONS (cont'd)**

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No. 6: Instructions and assignment not clear.  
No. 7: No communication link with crewmembers or supervisor.  
No. 8: Constructing fire line without safe anchor point.  
No. 9: Building fire line downhill with fire below.  
No. 10: Attempting frontal assault on fire.

Slide 4-24

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- 6. Instructions and assignment not clear.
- 7. No communication link with crewmembers or supervisor.
- 8. Constructing fire line without safe anchor point.
- 9. Building fire line downhill with fire below.
- 10. Attempting frontal assault on fire.

**THE 18 WATCH OUT SITUATIONS (cont'd)**

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No. 11: Unburned fuel between you and the fire.  
No. 12: Cannot see main fire, not in contact with anyone who can.  
No. 13: On a hillside where rolling material can ignite fuel below.  
No. 14: Weather is getting hotter and drier.

Slide 4-25

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- 11. Unburned fuel between you and the fire.
- 12. Cannot see main fire, not in contact with anyone who can.

- 13. On a hillside where rolling material can ignite fuel below.
- 14. Weather is getting hotter and drier.

**THE 18 WATCH OUT  
SITUATIONS (cont'd)**

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No. 15: Wind increases and/or changes direction.  
No. 16: Getting frequent spot fires across line.  
No. 17: Terrain and fuels make escape to safety zones difficult.  
No. 18: Taking a nap near the fire line.

Slide 4-26

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- 15. Wind increases and/or changes direction.
- 16. Getting frequent spot fires across line.
- 17. Terrain and fuels make escape to safety zones difficult.
- 18. Taking a nap near the fire line.

# THE 18 SITUATIONS THAT SHOUT — WATCH OUT!

**Mitigation Checklist – Using the Ten Standard Orders as Rules of Engagement**

1) Identify and mark the situations that apply to your assignment. 2) Review the listed fire orders to see if enacting the order will solve the problem. 3) Review pertinent guidelines and note what you did to manage the situation. 4) Disengage if orders cannot be satisfied or situations cannot be handled.

<i>✔/If a problem exists</i>	<b>SITUATION</b>	<b>FIRE ORDER #'s</b>	<b>HOW I HANDLED THE SITUATION</b>
<input type="checkbox"/>	1. Have I scouted and sized up the fire?	2	
<input type="checkbox"/>	2. Have I seen this country in daylight?	2	
<input type="checkbox"/>	3. Have I identified safety zones and escape routes?	4	
<input type="checkbox"/>	4. Do I understand weather and local factors affecting fire behavior?	3	
<input type="checkbox"/>	5. Am I clear on strategy, tactics and hazards?	8	
<input type="checkbox"/>	6. Do I have clear instructions and assignments?	8	
<input type="checkbox"/>	7. Have I established communication with my crew and supervisor?	7	
<input type="checkbox"/>	8. Am I constructing line from a safe anchor point?	4	
<input type="checkbox"/>	9. Am I building fire line downhill with the fire below?	2,3,4,5	
<input type="checkbox"/>	10. Am I attempting a frontal assault on the fire?	2,3,4,5	
<input type="checkbox"/>	11. Is there unburned fuel between me and the fire?	2,3,4,5	
<input type="checkbox"/>	12. Can I see main fire, or can I contact someone who can?	2,5,7	
<input type="checkbox"/>	13. Will I be on a hillside where rolling material can ignite fuel below?	2,3,4,5	
<input type="checkbox"/>	14. Is the weather becoming hotter and drier?	1,2,3	
<input type="checkbox"/>	15. Is the wind increasing and/or changing direction?	1,2,3	
<input type="checkbox"/>	16. Am I getting frequent spot fires across the line?	1,2,3,4,5	
<input type="checkbox"/>	17. Are terrain and fuels making escape to safety zones difficult?	2,3,4,5	
<input type="checkbox"/>	18. Have long hours made me feel like taking a nap near the fire line?	2	Slide 4-27

- C. The 10 Standard Firefighting Orders and the 18 Watch Out Situations are often found together. For example, view the checklist for safe practices on wildfire.

# THE 18 SITUATIONS THAT SHOUT — WATCH OUT! (cont'd)

Mitigation Checklist – Using the Ten Standard Orders as Rules of Engagement  
 1) Identify and mark the situations that apply to your assignment. 2) Review the listed fire orders to see if enacting the order will solve the problem. 3) Review pertinent ground ladders and other equipment to be handled.

<input checked="" type="checkbox"/> 1. Have I scouted		
<input type="checkbox"/> 2. Have I seen this		
<input type="checkbox"/> 3. Have I identified		
<input type="checkbox"/> 4. Do I understand		
<input type="checkbox"/> 5. Am I clear on strategy, tactics and hazards?		
<input type="checkbox"/> 6. Do I have clear instructions and assignments?	8	
<input type="checkbox"/> 7. Have I established communication?		
<input type="checkbox"/> 8. Am I constructing line from		
<input type="checkbox"/> 9. Am I building fire line downhill with the fire below?		
<input type="checkbox"/> 10. Am I attempting a frontal assault?		
<input type="checkbox"/> 11. Is there unburned fuel between me and the fire?		
<input type="checkbox"/> 12. Can I see main fire, or can I contact someone who can?	2,5,7	
<input type="checkbox"/> 13. Will I be on a hillside where rolling material can ignite fuel below?	2,3,4,5	
<input type="checkbox"/> 14. Is the weather becoming hotter and drier?	1,2,3	
<input type="checkbox"/> 15. Is the wind increasing and/or changing direction?	1,2,3	
<input type="checkbox"/> 16. Am I getting frequent spot fires across the line?	1,2,3,4,5	
<input type="checkbox"/> 17. Are terrain and fuels making escape to safety zones difficult?	2,3,4,5	
<input type="checkbox"/> 18. Have long hours made me feel like taking a nap near the fire line?	2	

Slide 4-28

- D. There are many inherent similarities between wildland firefighting and structural firefighting safety.

**VI. LOOKOUTS, COMMUNICATIONS, ESCAPE ROUTES AND SAFETY ZONES**

LOOKOUTS, COMMUNICATIONS, ESCAPE ROUTES AND SAFETY ZONES

- Lookouts.
- Communications.
- Escape routes.
- Safety zones.

Slide 4-29

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A. Remembering all of the Standard Firefighting Orders and Watch Outs can be complicated for firefighters not dealing with wildland fire every day. The essentials can be boiled down to LCES, designed by Paul Gleason in 1991.

LOOKOUTS



Slide 4-30

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1. Lookouts.
  - a. These lookouts are experienced firefighters and are looking over a California canyon with binoculars where five hotshot crews are mopping up in volatile brush fuel types.
  - b. They are looking for the first sign of smoke change, looking at the weather — taking relative humidity readings and looking for wind gusts, keeping track of where the crews are in relation to their escape routes and safety zones.

## LOOKOUTS (cont'd)

- Situations observed → communications.



Slide 4-31

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- c. Once a lookout sees a threatening situation develop, it is imperative that a good size-up report of the threat be communicated quickly and accurately to firefighters potentially in harm's way so that they may use an escape route and/or get into a safety zone in a timely manner.

## COMMUNICATIONS

- Flow up and down chain of command.
- Must be clear.
- Require speaking and listening skills.
- Require knowledge of radio equipment and frequency-use protocols.
- Prevent negative outcomes.



Slide 4-32

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2. Communications.
  - a. During periods of intense activity, it is imperative that good communications are flowing both up and down the chain of command.
  - b. Communications must be clear. Take special effort to say what you mean. The message must be understood.
  - c. Require good speaking and listening skills.

- d. Require knowledge of radio equipment and frequency-use protocols.
- e. Intent is to prevent unexpected, negative outcomes.

**COMMUNICATION AT OPERATIONS BRIEFING**

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- Incident Action Plan (IAP) must be reviewed.
- Clarification on assignments.



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- 3. Communication during operations briefing.
  - a. The Incident Command System (ICS) Form 201 or the Incident Action Plan (IAP) must be communicated. The plan is not functional until it gets to the people who will execute it.
  - b. Ask questions and get clarification if your assignment is not clear.

**ESCAPE ROUTES**

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- Must be well-known to everyone.
- Avoid steep, narrow, or substandard routes or roads.
- Use traffic control if necessary.
- Can become traps in heavy fuels.



Slide 4-34

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- 4. Escape routes.
  - a. Must be well-known to everyone.

- b. Avoid escape routes on steep, narrow, or substandard routes or roads.
- c. Use traffic control if necessary.
- d. Escape routes can become traps for resources in heavy fuels.

### SAFETY ZONES

- Large enough for intended users.
- Adequate distance from radiant heat.
- Location known by everyone.
- Avoid long travel time or distance.
- Or pretreat, leave, and return after fire front passes.



Slide 4-35

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- 5. Safety zones.
  - a. The safety zone needs to be large enough to accommodate everyone planning to use it.
  - b. They need adequate distance from fuels to avoid unacceptable radiant heat.
  - c. Must identify and communicate location to all personnel — request confirmation that the location is understood.
  - d. Avoid using safety zones that would require a long travel distance or time. Some light fuel/grass areas can be made into safety zones by burning out before the fire arrives, if you have the opportunity and resources to do it properly. An area that has already burned (**good black**) can be the safest area for a safety zone.
  - e. Sometimes there are no good safety zones, and using an escape route to get out of an area is the correct thing to do. If a safety zone is not available then pretreat, leave, and come back when safe to do so, after the fire front passes.




B. The flow chart depicts how LCES does or does not work in practice.

**LCES IN THE WUI**

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- Post lookouts who can see the fire.
- Establish audiovisual signals.
- Maintain radio discipline frequencies.
- Preplan escape routes.
- Identify safety zones.
- Use structures and vehicles as last resort.



Slide 4-38

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C. LCES in the WUI.

1. Post lookouts who can see the fire.
2. Establish audiovisual signals.
3. Maintain radio discipline frequencies.
4. Preplan escape routes.
5. Identify safety zones, such as parking lots, parks, golf courses, schools, etc.
6. Use structures and vehicles as last resort shelters. A well-built house will afford considerable protection from a rather intense wildland fire on the outside.

**DVD PRESENTATION**

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**“FIREFIGHTER SAFETY — LOS ALAMOS”**



Slide 4-39

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## ACTIVITY 4.1

### The 18 Watch Out Situations

#### **Purpose**

To help structural firefighters recognize the correlation between hazardous situations in structural firefighting and other familiar types of responses to hazardous situations in the WUI incident responses.

#### **Directions**

1. Work in your previously assigned small table groups.
2. The instructor will assign each group four to five of the 18 Watch Out Situations as your primary discussion items, and the remaining situations are your secondary discussion items, if time permits.
3. In your groups, discuss and list the possible types of issues found for normal structural fire responses, WUI responses and other responses when encountering the assigned situations that shout “Watch Out.”
4. Post your answers on an easel pad. Select a representative for your group, and be prepared to share your answers with the class when directed by the instructor.
5. If time permits, continue to discuss and list answers for the remaining secondary discussion items, and be prepared to share those answers with the class.

#### **Example**

1. Fire not scouted and sized up.

##### **Structural**

- Unknown location of fire in building.
- Unknown what is burning.
- Extent of the fire.
- Flashover potential.

##### **Wildland**

- Unknown what fire is doing.
- Change in direction.
- Change in fuel type.
- Exposures.

##### **Other response situations**

- Hazmat: what is spilled, how much, where is it, victims.
- Medical: patient access, weapons, communicable diseases.
- Motor vehicle incidents: fluid leaks, fuel/electrical considerations, traffic.
- Technical rescue: loose rocks, air quality.

**Situations**

2. In country not seen in daylight.

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3. Safety zones and escape routes not identified.

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4. Unfamiliar with weather and local factors influencing fire behavior.

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5. Uninformed on strategy, tactics and hazards.

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6. Instructions and assignments not clear.

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7. No communications link between crewmembers and supervisors.

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8. Constructing fire line without safe anchor point.

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9. Building fire line downhill with the fire below.

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10. Attempting frontal assault on the fire.

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11. Unburned fuel between you and the fire.

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12. Cannot see main fire, not in contact with anyone who can.

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13. On a hillside where rolling material can ignite fuel below.

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14. Weather is getting hotter and drier.

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15. Wind increases and/or changes direction.

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16. Getting frequent spot fires across line.

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17. Terrain or fuels make escape to safety zones difficult.

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18. Taking a nap near fire line.

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VII. HAZARDS



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A. Initial response.

1. Driving accidents are a leading cause of injuries and fatalities to firefighters, and WUI fires significantly increase the risk of vehicle accidents.
2. Drive with extra caution in fire and/or smoky conditions.
3. Speed is a leading cause of accidents involving emergency vehicles.
4. If you cannot see what is ahead, stop.
5. Anticipate road hazards and drive defensively. Where access or visibility is marginal, send someone ahead in a small vehicle or on foot to scout if necessary.
6. With poor visibility, use headlights and emergency lights even when stationary and park well out of roadways.
7. Keep adequate spacing to stop in a hurry if necessary, especially when traveling long distances on highways. Consider whether you really need to go lights and siren for 50 to 75 miles or more.
8. Know where you are going before you travel, and plan stops for logistics and safety purposes.

### DRIVING HAZARDS

- Smoke, ash, dust, and night operations.
- Cannot see, stop, send operations or recon person.
- Use headlights and flashers for safety.



Slide 4-42

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B. Driving hazards.

1. Reduced visibility due to smoke, ash, dust or darkness can be especially dangerous for emergency vehicle drivers. In addition, windy conditions with active burning, panicked public traffic, and additional reduced visibility at night will add to the pre-existing dangerous environment.
2. If you cannot see what is ahead, stop.
3. Anticipate road hazards; send someone ahead on foot to scout if necessary.
4. In poor visibility situations, use headlights and emergency flashers even when stationary.

### DRIVING HAZARDS (cont'd)

- End result of reduced visibility.



Slide 4-43

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5. The combination of blowing smoke, ash and dust during night operations results in about **zero** visibility.

6. The engine pictured was traveling about 5 miles per hour (mph), trying to follow the road, when this accident happened.

**DRIVING HAZARDS (cont'd)**

- Not a good situation.



Slide 4-44

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7. The engine and crew had a very close call.

**FUEL LOADING AND ROADS**

- Wide enough to drive through when burning?



Slide 4-45

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C. Fuel loading and roads.

1. Is the road wide enough to drive through when the forest is burning?
2. Be especially aware of fire potential on midslope roads, as these have the greatest potential for burn-over accidents.

## ROAD WIDTH

- Is this getting too hot?



Slide 4-46

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### D. Road width.

1. Roadways and/or road shoulders are no place to be with active or intense burning conditions and any appreciable fuels on both sides.
2. The slightest wind shift, or increase in fire intensity, could result in injuries, vehicle damage, or burn-over.

## DRIVING IN FIRE AREA

- Learn from previous mistakes.



1918: Cloquet, MN



Slide 4-47

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### E. Driving through fire-involved area.

1. Many firefighters and civilians get caught trying to drive through a fire-involved area.
2. Over the last 100 years, numerous firefighters and civilians have been needlessly killed and others needlessly burned significantly. We need to learn from others' mistakes by reviewing and discussing these accidents with our personnel when they occur and reports are published.

## UNDERESTIMATING FIRE INTENSITY



Slide 4-48

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- F. Underestimating fire intensity.
  - 1. Relatively light fuels can be deceptively deadly.
  - 2. Calculate the worst-case scenario, and worst-case fire behavior possible, before deciding to continue or not.

## SMOKE AND FREEWAYS



Slide 4-49

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- G. Smoke and freeways.
  - 1. Use extreme caution when working on fires near roadways with smoke blowing across the roadway.
  - 2. Civilians do not anticipate fire personnel or apparatus when they suddenly encounter smoke crossing their path on the roadway.
  - 3. Drivers take very erratic actions when encountering smoke or fire near roadways, including driving the wrong way on the roadway.



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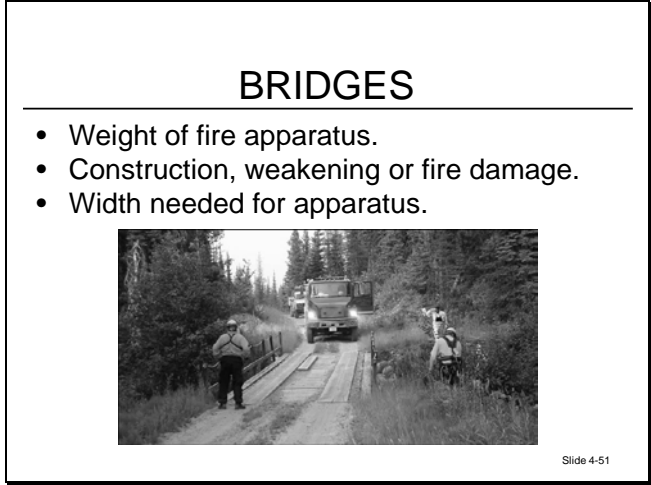
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H. Hazards: Mitigate them! Use whatever is available to mitigate road-related hazards, such as electronic reader boards, road signs, barricades and road cones.



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- I. Bridges can present many hazards.
1. Consider the weight of engines, and especially water tenders, compared to load limits of bridges. Look for load limit signs.
  2. Consider the condition of bridge construction. Are there signs of weakening, burning or fire damage?
  3. Consider the width required for vehicles with dual wheels in rear.

### ENGINE ACCESS

- Septic tanks.
- Drainage pipes and culverts.
- Erosion.
- Sloughing.
- Soil slippage.



Slide 4-52

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- J. Engine access around structures provides special hazards.
1. Consider that rural homes may have septic tanks.
  2. May be drainage pipes, culverts.
  3. May be road erosion, sloughing or slippage.

### TRIPS AND FALLS

- Limited visibility and focused concentration.
- Rocks, holes.
- Uneven terrain.
- Barbed wire.
- Other fencing.



Slide 4-53

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- K. In wildland terrain, especially with limited visibility and your concentration directed to the fire, slips, trips and falls are a significant hazard. Beware of:
1. Rocks, holes, uneven terrain.
  2. Barbed wire and other fencing.
  3. Barbed wire and some fences are especially hard to see.

### ELECTRICAL

- Downed power lines may be energized or re-energize unexpectedly.
- Poles may ignite, burn through or fall.
- Metal fences could be electrically charged.



Slide 4-54

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- L. The power company needs to be tied in to operations in a WUI fire via Incident Command or Incident Command Post (ICP). Hazards include:
1. Downed power lines may be energized or re-energize unexpectedly.
  2. Power poles may ignite, burn through or fall.
  3. Metal fences and/or barbed wire could be electrically charged.

### ELECTRICAL (cont'd)

- Distribution and transmission lines can arc, short out and fall due to smoke.
- Aircraft drops can also cause shorts, arcs and downed power lines.
- Substations require special caution.



Slide 4-55

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4. High voltage distribution and power transmission lines can short out or arc and fall when smoke surrounds or passes through them. Be extremely careful when working on any fire under or near power lines.
5. Retardant or water drops from planes and helicopters can also cause arcing, shorting out and falling power lines.
6. Power lines, transformers and substations all need special safety consideration in WUI fires.

## GENERATOR BACKFEED

- Portable generators may re-energize system.
- Overpower system equipment causing fire, explosion, shorting, arcing, or falling lines/equipment.



Home Generator Backfeed

Slide 4-56

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- M. A portable generator improperly hooked up to a household electrical panel can backfeed through the power system, stepping up power through transformers, and re-energize portions of the power system or cause shorting out, arcing, explosions, fires, or falling lines or equipment.

## UNKNOWN CONTAINERS

- Unidentifiable, clear around.
- Let off gas or explode in fire area.
- Colored smoke or flame.
- Unusual odors.
- Stay upwind.
- Use caution.
- Identify before fire.



Slide 4-57

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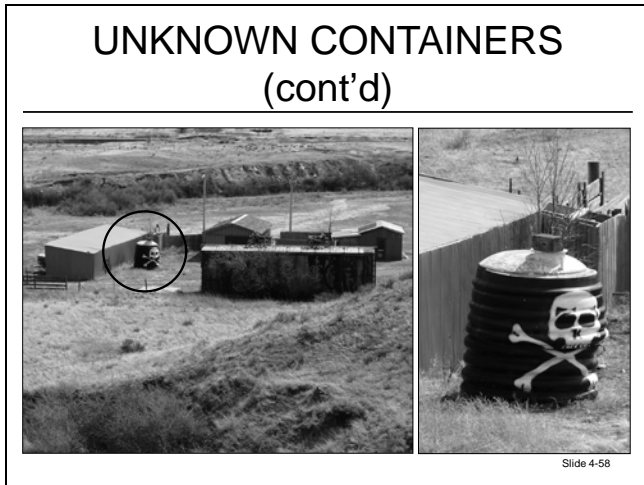
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- N. Unknown containers.
1. Rural properties often have their own fuel, chemicals, pesticides, herbicides and fertilizers on the property, which can let off gas and/or explode when they are exposed to a fire and are hazardous to emergency responders. Many of these are not marked, and contents may not be identifiable.
  2. Clear combustibles around these if time permits.
  3. Watch for unusual smoke colors and any unusual odors.
  4. Stay upwind from burning buildings.

5. Identify these before fire arrives, if possible.



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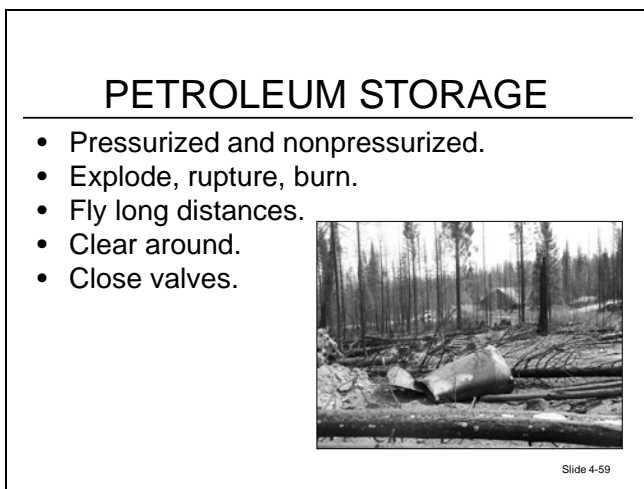
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6. The picture is an isolated area of outbuildings on a larger ranch.
7. With grass fuel types, this complex may be defensible if it was not very windy; however, once any of the buildings catch on fire, it is highly recommended to get out of the area.
8. If time permits, clear all combustibles from around these to prevent exposure.
9. Evacuate all personnel and deny access to others.
10. Report location of suspected hazardous materials, request hazmat specialists.



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- O. Petroleum storage.

1. Containers may be pressurized or nonpressurized and can explode, rupture and burn.
2. These containers and/or shrapnel may fly long distances.
3. Clear combustibles around these if time permits, and close any tank valves.

**PRESSURE VENTING**

- Vent when over-pressurized due to heat.
- Sounds like jet engine.
- May reset when cooled.
- Use caution.
- Cool or evacuate the area.



Slide 4-60

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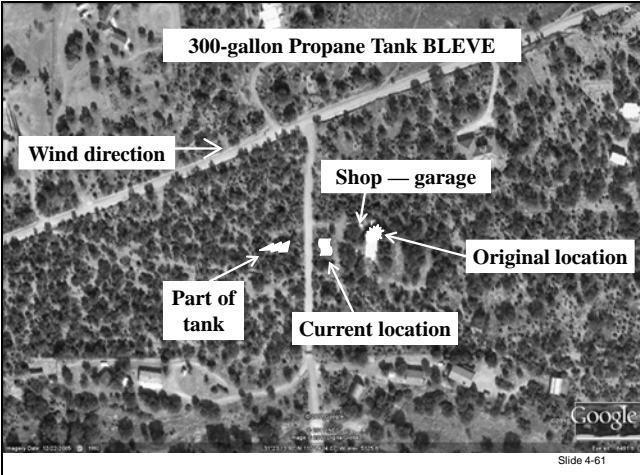
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4. Most pressurized containers will vent to relieve pressure due to excessive heat from burning adjacent combustibles.
5. Sounding like a small jet engine going off, venting gas tends to get the attention of everyone nearby.
6. The tank's pressure relief valve may reset once pressure is relieved and heat is reduced.
7. Use extreme caution, and cool or evacuate the area.



Slide 4-61

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8. There were several engine companies deployed in this neighborhood just after the wildfire passed through. They were extinguishing and overhauling building starts when the blast occurred.



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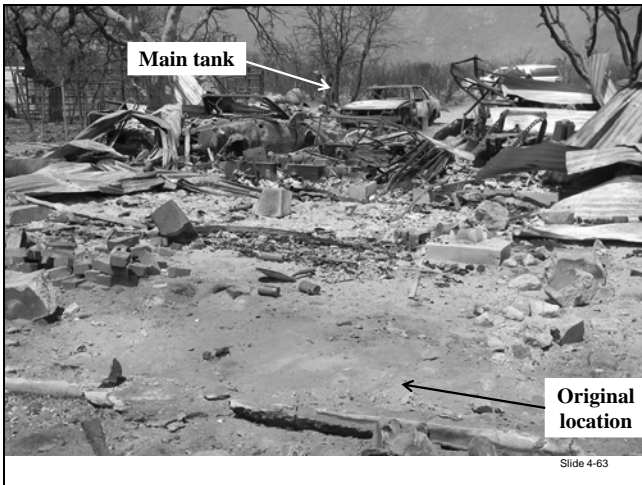
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9. This 300-gallon propane tank was immediately next to a garage and flew over 250 feet.

10. The blast was easily heard about 2 miles away inside a school building.



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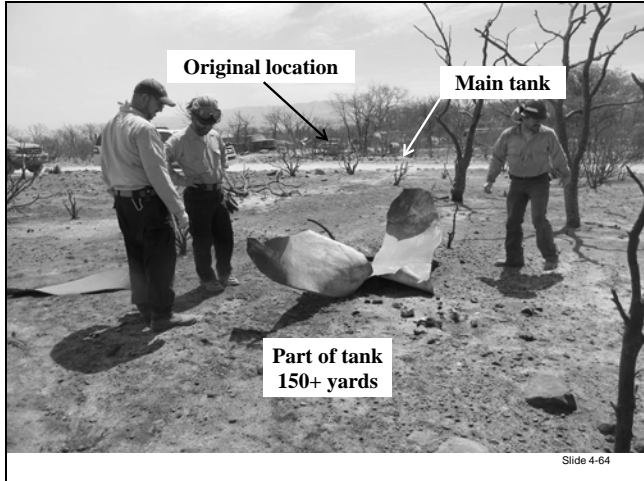
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11. The main portion of tank rocketed over the garage and into the wind for about 250 feet.



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12. This portion of the propane tank rocketed over 150 yards away.

**POISONOUS PLANTS**

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- Poison ivy.
- Poison oak.
- Brazilian pepper plant.



Slide 4-65

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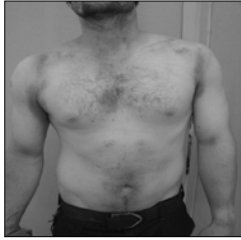
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- P. Different parts of the country have vegetation types that can present a problem to firefighters, such as poison ivy, poison oak and Brazilian pepper plant.
1. When their oils contact exposed skin, rashes develop. Some individuals have more sensitivity to these oils and develop adverse (anaphylactic) reactions.
  2. The smoke from such plants burning, when inhaled, can cause severe respiratory tract problems and total body rash.

### POISONOUS PLANTS (cont'd)

- Very uncomfortable.
- May require medical attention.



Slide 4-66

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3. Reactions after exposure to poisonous plants may be very uncomfortable, and complications may require medical attention if severe.

### HELICOPTER DROPS

- Drops may be injurious or damaging.
- Rotor wash may increase fire behavior and spread burning embers.
- May blow rocks, brush and debris.



Slide 4-67

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- Q. Helicopter drops.
1. Weight of water or retardant may be injurious and damaging.
  2. Rotor wash may increase fire behavior as helicopters pass over fire area or spread burning embers across line.
  3. They may blow rocks, brush and debris.

## AIR TANKER DROPS

- May be injurious and damaging.
- Can level everything in path.
- Blows rocks, brush and debris.
- Requires good communication.
- Evacuate area or seek shelter.
- Slippery.
- Corrosive to metal.



Slide 4-68

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### R. Air tanker drops.

1. Retardant drops from air tankers can be very dangerous to anyone on the ground where the drop occurs. If it is too low and it is condensed instead of disbursed, it can level everything in its path. Firefighters have been killed and engines destroyed from drops.
2. There should be communication from air to ground that a drop is incoming at a specific location. Fire resources need to leave the drop area before the drop.
3. Sometimes a lead plane or tanker will fly the flight path just prior to the air tanker coming in for a drop. Pay attention — lookouts should be watching to warn others if a drop is approaching.
4. If you cannot get out of the drop zone, get behind a solid object that will shelter you from the retardant, such as behind a house, behind/under your engine, or behind the trunk of a large solid tree. A low concentrated drop will knock down treetops, limbs and snags.
5. Road surfaces, especially asphalt or concrete, will be extremely slippery if covered by retardant.
6. Retardant is very abrasive and corrosive. If time and conditions allow, wash off vehicles by re-wetting and scrubbing it off as soon as possible.

## ROLLING ROCKS

- When logs, stumps and trees are burned.
- When soil is weakened by fire.
- Use caution below slopes.
- Post lookouts.
- Alert others.
- Caused injury and death to firefighters.



Slide 4-69

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### S. Rolling rocks.

1. Rocks will come down steep slopes when fire consumes the logs, stumps and trees holding them back or weakens the soil.
2. Use caution below slopes, post lookouts, and alert others. These have injured and killed firefighters.

## SNAGS

- A standing dead tree.
- Fire continuously consumes and weakens the holding roots of the standing trees.
- Fall the tree, or mark and secure area, if anyone is going to work in the danger zone.



Slide 4-70

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### T. Snags — a standing dead tree.

1. Fire continuously consumes and weakens the holding roots of standing trees.
2. Fall the tree, or mark and secure the area, if anyone is going to work in the danger zone.

### CUTTING TREES

- Only trained and qualified fallers should cut down trees.
- Post lookouts and secure danger zone.



Slide 4-71

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U. Cutting down trees.

1. Only trained and qualified fallers should cut down trees.
2. Post lookouts and secure the area first.

### FATIGUE

- Long-duration incidents.
- Physical and mental fatigue.
- Observe and manage.
- Plan rest, rotation and rehab.
- Caffeine is no substitute for rest.
- Can impair decisions and judgment.



Slide 4-72

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V. Fatigue.

1. WUI fires can be very long-duration incidents. Fatigue both physically and mentally needs to be watched and managed. Plan ahead for rest, rotation and rehab.
2. Coffee and caffeine do not substitute for needed rest.
3. Fatigue can impair judgment and affect decisions and proper thinking of firefighters.

## EMOTIONS

- Expect high and low emotions in personnel.
- Can affect people differently.
- Do not allow decisions based on emotions only.



Slide 4-73

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W. Emotions — WUI fires can bring on a roller coaster of emotional ups and downs.

1. There can be a wide variety of emotions expected to be shown toward firefighters when homes are lost.
2. Emotions, extended fatigue and other human factors could adversely affect people and safety attitudes differently.
3. Do not allow decisions to be based solely on emotions.

## MOBILE PUMPING

- Dangerous operations.
- Impaired vision.
- Firefighters are exposed to heat and smoke.
- Easily trapped.



Slide 4-74

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X. Mobile pumping operations with an engine, also called pump and roll operations, are very dangerous. Such operations have resulted in numerous fatalities and a significant number of serious firefighter injuries.


1. Driver and firefighters have the probability of impaired vision, making it difficult to see fire, road hazards, terrain issues, and other people on the ground.

2. Firefighters are exposed to extreme heat and smoke, especially if water or suppression efforts are not working.
3. Due to conditions, it is easy for the driver or firefighters on exterior of apparatus to become entrapped in fire or smoke and risk serious injury or death.

**VIII. INCIDENT WITHIN AN INCIDENT**

**INCIDENT WITHIN AN INCIDENT**

- Burn-over — burned firefighter.
- Firefighter injury/accident.
- Fire shelter deployment.
- Vehicle accident.
- Follow medical plan.
- Designate a supervisor in charge.



Slide 4-75

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- A. Requires a supervisor to take charge and handle.
- B. May require separate radio frequency.
- C. Follow your contingency medical plan.
- D. Initiate and facilitate a proper response.
- E. May result in a change in operational objectives and abilities — changed plans.
- F. Notification, follow-up and investigation.

**IX. AFTER-ACTION REVIEW**

**AFTER-ACTION REVIEW**

- Conducted for improvement purposes.
- Encourages input from participants focused on:
  - What was planned?
  - What actually happened?
  - Why did it happen?
  - What can be done better the next time?



Slide 4-76

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- A. A crew, company or unit as a standard practice generally does an AAR immediately after a shift on an incident for improvement purposes. The practice was developed by the military during field combat operations.
  
- B. The climate surrounding an AAR must be one in which the participants openly and honestly discuss what transpired, in sufficient detail and clarity, so that everyone understands what did and did not occur and why. Everyone is encouraged to participate, and the leader is generally the facilitator.
  
- C. Participants should participate and leave with a strong desire to improve their proficiency and safety.
  
- D. The AAR format can be found in the “Incident Response Pocket Guide.”
  - 1. What was planned?
  - 2. What actually happened?
  - 3. Why did it happen?
  - 4. What can we do differently or better next time?

**AFTER-ACTION REVIEW  
(cont'd)**

- What was planned?
  - Establishes what was planned at the beginning of the operational period.
  - Uses IAP, briefing, leader's intent.
  - Measures whether or not personnel understood what was expected of them at the beginning of the operational period.

Slide 4-77

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E. What was planned?

1. Review what the plan was — a combination of the IAP, the briefing given by the supervisor, and leadership intent.
2. Was it a good plan?
3. This phase measures whether personnel understood what was expected of them at the beginning of the operational period.

**AFTER-ACTION REVIEW  
(cont'd)**

- What actually happened?
  - Pools multiple perspectives to build a shared picture of what happened.
  - Identifies changes that happened during the assignment that differed from original briefing.
  - Measures the effectiveness of briefings and whether changes in assignments were communicated to everyone.

Slide 4-78

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F. What actually happened, and why/how did changes occur?


1. This phase helps to identify information dissemination — were the changes communicated and understood by everyone? When there are substantial changes, this is important.
2. This phase pools multiple perspectives to build a shared picture of what happened.

3. It identifies changes that happened during the assignment that differed from the original plan and briefing.
4. It measures the effectiveness of the briefings and whether changes in assignments were communicated to everyone.

**AFTER-ACTION REVIEW**  
**(cont'd)**

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- Why did it happen?
  - Draw out explanations of why things occurred.
  - Analysis of cause and effect.
  - Focus on what and not whom.



Slide 4-79

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G. Why did it happen?

1. In any given operation, there is generally a combination of successes and failures. It is rare that all actions are performed perfectly or dismally.
2. An AAR is an opportunity to answer questions that some members may have and to explain why changes occurred in order to give everyone a better understanding of the big picture.
3. In this phase, focus on what occurred and analyze the cause and effects, not so much on whom.

**AFTER-ACTION REVIEW**  
**(cont'd)**

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- What can we do better next time?
  - Improve on weaknesses.
  - Identify actions or procedures that can be executed more efficiently.
  - Sustain/Maintain strengths.
  - Identify areas where groups are performing well and used innovative solutions to issues or problems.
  - Leave on a positive note.

Slide 4-80

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# **APPENDIX**

## **THE “18 WATCH OUT SITUATIONS” CHECKLIST**

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### The “18 Watch Out Situations” Checklist

- 1. Fire not scouted and sized up.
- 2. In country not seen in daylight.
- 3. Safety zones and escape routes not identified.
- 4. Unfamiliar with weather and local factors influencing fire behavior.
- 5. Uninformed on strategy, tactics and hazards.
- 6. Instructions and assignments not clear.
- 7. No communications link between crewmembers and supervisors.
- 8. Constructing fire line without safe anchor point.
- 9. Building fire line downhill with the fire below.
- 10. Attempting frontal assault on the fire.
- 11. Unburned fuel between you and the fire.
- 12. Cannot see main fire, not in contact with anyone who can.
- 13. On a hillside where rolling material can ignite fuel below.
- 14. Weather is getting hotter and drier.
- 15. Wind increases and/or changes direction.
- 16. Getting frequent spot fires across line.
- 17. Terrain or fuels make escape to safety zones difficult.
- 18. Taking a nap near fire line.

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# **UNIT 5: STRATEGIC AND TACTICAL OPERATIONS**

## **TERMINAL OBJECTIVE**

*The students will be able to:*

- 5.1 *Operate safely and effectively at a Wildland Urban Interface (WUI) incident and reduce home and property loss.*

## **ENABLING OBJECTIVES**

*The students will be able to:*

- 5.1 *Describe typical strategies, tactics, tasks and issues involved when covering a fire station other than their own.*
  - 5.2 *Describe typical strategies, tactics, tasks and issues involved when participating in evacuation, rescue and WUI tactics.*
  - 5.3 *Describe typical strategies, tactics, tasks and issues involved when establishing and operating water supply operations.*
  - 5.4 *Describe typical strategies, tactics, tasks and issues involved when performing structural and site preparation in advance of an eminent wildland fire.*
  - 5.5 *Describe typical strategies, tactics, tasks and issues involved when performing structural protection.*
  - 5.6 *Describe typical strategies, tactics, tasks and issues involved when patrolling and performing mop-up operations.*
  - 5.7 *Express the emphasis of preparation before a wildfire begins.*
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## UNIT 5: STRATEGIC AND TACTICAL OPERATIONS

Slide 5-1

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### ENABLING OBJECTIVES

- Describe typical strategies, tactics, tasks and issues involved when:
  - Covering a fire station other than your own.
  - Participating in evacuation, rescue and Wildland Urban Interface (WUI) tactics.
  - Establishing and operating water supply operations.

Slide 5-2

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### ENABLING OBJECTIVES (cont'd)

- Performing structural and site preparation in advance of an eminent wildland fire.
- Performing structural protection.
- Patrolling and performing mop-up operations.
- Express the emphasis of preparation before a wildfire begins.

Slide 5-3

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**I. MUTUAL AID**

**MUTUAL AID**

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- Mutual aid.
- Automatic aid.
- Standard operating procedures (SOPs) should be in effect for either of the above.

Slide 5-4

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- A. Mutual aid provides additional personnel and equipment upon request to aid in an incident.
- B. Automatic aid provides additional personnel and equipment for certain predetermined incidents. Request for automatic aid is part of the original page-out.
- C. Standard operating procedures (SOPs) should be in effect for either mutual aid or automatic aid.

**II. COVERING OTHER STATIONS**

**COVERING OTHER STATIONS**

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- Provide coverage for stations that are committed to an incident in their own area.
  - Assignment possible of hours or days.
  - May rotate into front-line positions.
  - Should have predetermined agreements.

Slide 5-5

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- A. Provide coverage for stations that are committed to an incident in their own area.
  - 1. These move-up assignments may be for hours or can even be for days.

2. If the jurisdictional station still has apparatus in quarters, you may be asked to rotate into front-line positions.
3. Sometimes these move-ups are the result of predetermined agreements. If so, these agreements need to answer the following questions:
  - a. Whose apparatus are you to use?
  - b. Who pays for any expendables used?
  - c. What communications frequencies are we to use?
  - d. Whose insurance are we covered under? Yours and/or theirs?

**COVERING OTHER STATIONS**  
(cont'd)

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- You are a visitor. Treat the station as you would like your station to be treated.
  - Food.
  - Linens.
  - Lock-up security.
  - Equipment.
  - Expendables.
  - Trash.



Slide 5-6

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- B. You are a visitor. Treat the station as you would like your station to be treated. This can become a major issue, so if you need to use or borrow food, equipment or supplies, make a note of it and leave in it the Company Officer's (CO's) office. Remember to treat their facility as if it was your own!
1. Food — replace the food you use.
  2. Linens — if you use them, clean them.
  3. Lock-up security — ensure that you secure their facility just as you would do in your own department.
  4. Equipment — if you use it, clean and maintain it.
  5. Expendables — if you need to use them, make a list and attempt to replace prior to leaving.
  6. Trash — clean up after yourselves, and take the trash out.

**COVERING OTHER STATIONS**  
**(cont'd)**

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- On arrival:
  - Check in.
  - Understand access and lock-up procedures.
  - Obtain area maps.
  - Obtain communications frequencies.
  - Obtain response report forms.
  - Understand report filing procedure.

Slide 5-7

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- C. On arrival at another fire station:
1. Check in on their fire phone or with the dispatch office.
  2. Understand access and lock-up procedures. Lots of fire departments have maps and procedures for move-up companies adjacent to the fire station's dispatch computer or dispatch telephone.
  3. Obtain area maps, if available. If you can't find any, check with administration staff members at the station or at their headquarters.
  4. Obtain communications frequencies from dispatch or administrative staff.
  5. Obtain response report forms from their company files or, again, check with administration.
  6. Understand report filing procedure. Get a small cardboard box, and leave the completed files in it with a note on top so that they can file properly.

**COVERING OTHER STATIONS**  
**(cont'd)**

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- Host driver/operator.
  - Familiar with area.
  - Familiar with host equipment.
  - Familiar with reports and filing procedures.
- Host "pilot."
  - Acts as navigator when your equipment is used.
  - Familiar with area and local policies.

Slide 5-8

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- D. Host driver/operator — occasionally, a member of the fire station may be there to assist you and/or serve as your navigator on dispatches to incidents. If available, remember that he or she is:
  - 1. Familiar with area.
  - 2. Familiar with host equipment.
  - 3. Familiar with reports and filing procedures.
- E. Host “pilot” — another term for a person who has local knowledge and can be of assistance to you and your crew:
  - 1. Acts as navigator when your equipment is used.
  - 2. Familiar with area and local policies.

**III. EVACUATION, RESCUE AND WILDLAND URBAN INTERFACE TACTICS**

<b>EVACUATION, RESCUE AND WUI TACTICS</b>
<ul style="list-style-type: none"><li>• Most residents will know that there is a large fire.</li><li>• Some will not know if it is a distance away.</li><li>• Many will not know what they should do to protect themselves.</li><li>• Many will not know what they should do to protect their property.</li><li>• Many will not want to leave.</li></ul>
<small>Slide 5-9</small>

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- A. When an evacuation order is put into place at a Wildland Urban Interface (WUI), there are a lot of questions that need to be answered. These questions must be communicated to the entire area and population impacted by this incident.
  - 1. Most residents will know that there is a large fire.
  - 2. Some will not know if it is a distance away.
  - 3. Many will not know what they should do to protect themselves.
  - 4. Many will not know what they should do to protect their property.

5. Many will not want to leave.

**EVACUATION, RESCUE AND  
WUI TACTICS (cont'd)**

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- Evacuation and rescue are not the same.
  - Evacuation.
    - Semiplanned.
    - Somewhat orderly.
  - Rescue.
    - Last minute attempt.
    - Usually a result of prior refusal to leave.
    - Puts rescuer and resident in danger.

Slide 5-10

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B. Evacuation and rescue are not the same.

1. Evacuation.

- a. Semiplanned — often, we will use trigger points to start the evacuation process in the varying areas.
- b. Somewhat orderly — remember, choke points do occur as residents come to stop signs/lights. Have Law Enforcement set up a coordinated traffic plan to reduce these choke points.

2. Rescue.

- a. May all be a last minute attempt due to an erratic or fast-moving fire.
- b. This usually is a result of the resident's refusal to leave.
- c. Puts rescuer and resident in danger.

**EVACUATION, RESCUE AND  
WUI TACTICS (cont'd)**

- Evacuation.
  - Early time of notification is essential.
  - Provide a route to leave area.
  - Provide a route to a shelter location if established.
  - Provide assurances, but not promises.
  - Have residents take only what they need.

Slide 5-11

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C. Evacuation.

1. Early time of notification is essential. That is why it is essential to establish trigger points.
2. Provide a route to leave area. Often the Incident Commander (IC) will establish one-way routes out for evacuees and one-way routes in for only emergency personnel.
3. Provide a route to an evacuation shelter location if established.
4. Provide assurances to the residents, but do not make promises.
5. Have residents take only what they need.
  - a. Clothes.
  - b. Money; checkbook; and credit, ATM and identification cards.
  - c. Important papers (e.g., birth certificates, marriage licenses, social security cards, and Veterans Affairs (VA) or medical records).
  - d. Pets.
  - e. Laptops, notebooks or desktops (if there is time).
  - f. Medicines.

**EVACUATION, RESCUE AND  
WUI TACTICS (cont'd)**

- Many people will want to “stay and defend.”
  - Nothing will be gained by arguing with residents.
  - Inform them of the consequences of staying.
  - Inform them that help may not be available to them at a later time.
- Note names and locations, and refer the list to supervisors.

Slide 5-12

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6. Many people will want to “stay and defend.”
  - a. Nothing will be gained by arguing with residents.
  - b. Inform them of the consequences of staying.
  - c. Inform them that help may not be available to them at a later time.
7. Note names and locations, and refer the list to supervisors.

**EVACUATION, RESCUE AND  
WUI TACTICS (cont'd)**

- Some residents may only be removed by Law Enforcement officers.
- Resource focus should be on notifying residents and assisting those who cannot leave on their own.
- Evacuees should be encouraged to provide their own transportation.

Slide 5-13

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8. Some residents may only be removed by Law Enforcement officers.
9. Resource focus should be on notifying residents and assisting those who cannot leave on their own.
10. Evacuees should be encouraged to provide their own transportation.

**EVACUATION, RESCUE AND  
WUI TACTICS (cont'd)**

- Evacuation route should allow for at least one open lane for emergency vehicles.
- Specific, separate evacuation and response routes, if available.
- Coordinate with other response resources in the area through supervisors.

Slide 5-14

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11. Evacuation route should allow for at least one open lane for emergency vehicles.
12. Specific, separate evacuation and response routes, if available.
13. Coordinate with other response resources in the area through supervisors.

**EVACUATION, RESCUE AND  
WUI TACTICS (cont'd)**

- Rescue.
  - Dangerous for both rescuer and person being rescued.
  - In most cases, the people being rescued placed themselves in the situation.
  - Requires commitment to one individual instead of overall assignment.
  - Weigh "risk" versus "reward" factors.

Slide 5-15

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- D. Rescue.
  1. Dangerous for both rescuer and residents.
  2. In most cases, the residents placed themselves in the situation.
  3. Requires commitment to one individual instead of overall assignment.
  4. Weigh "risk" versus "reward" factors.

**WUI TACTICS**

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- Direct attack.
  - Anchor.
  - Flank.
  - Pinch.
- Indirect attack.

Slide 5-16

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E. WUI tactics.

1. Direct attack.

a. Anchor.

- Get a good, solid point to begin.
- Such as a roadway, river, pond, etc.

b. Flank.

- Work both side of the fire if fuel and fire length are conducive.
- Consider hand crews.
- Use progressive hoselays if possible.

c. Pinch (pincer action).

- Can be by pressing the flanks together using a backfiring operation.

2. Indirect attack.

- a. Used when fire and flame lengths do not allow a direct attack.
- b. Construct fire line away from fire at a place where you can secure an anchor spot, thus taking advantage of existing barricades.
- c. Allows you to locate a fire line along favorable topography.

## ACTIVITY 5.1

### Evacuation and Rescue

#### Purpose

To continue command operations started in Activity 3.1 with the arrival of new resources and changes in the severity of the incident.

#### Directions

1. Work in your previous two-person groups.
2. **Do not** consider structural protection at this time.
3. Continue to use the resources from Activity 3.1.
4. Continue with Incident Command System (ICS) Form 201, which you used in Activity 3.1.
5. Follow the instructions on the slides.

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IV. WATER SUPPLIES

**WATER SUPPLIES**

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- Types of water systems:
  - Municipal systems.
  - Small community systems.
  - Private residential wells.
  - Private commercial wells.
  - Rivers, ponds and stock tanks.

Slide 5-24

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- A. There are many types of water systems that firefighters come into contact with at a WUI, which include:
1. Municipal systems.
  2. Small community systems.
  3. Private residential wells.
  4. Private commercial wells.
  5. Rivers, ponds and stock tanks.

**WATER SUPPLIES (cont'd)**

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- Municipal systems.
  - Require electrical power to operate.



Slide 5-25

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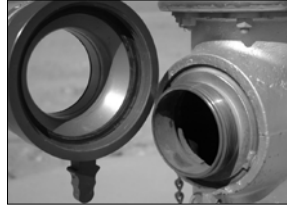
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- B. Municipal systems.
1. Require electrical power to operate.

### WATER SUPPLIES (cont'd)

- Require electrical power to operate.
- Hydrant discharge thread or size incompatibility.



Slide 5-26

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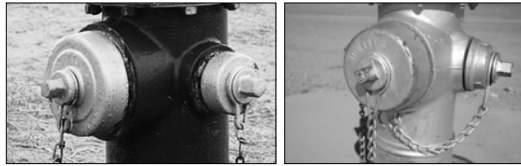
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2. Hydrant discharge thread or size incompatibility with that of your apparatus.

### WATER SUPPLIES (cont'd)

- Require electrical power to operate.
- Hydrant discharge thread or size incompatibility.
- Hydrant valve and cap lug incompatibility.



Slide 5-27

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3. Hydrant valve and cap lug incompatibility. You may need a special hydrant wrench check before you need to use the hydrant.

### WATER SUPPLIES (cont'd)

- Require electrical power to operate.
- Hydrant discharge thread or size incompatibility.
- Hydrant valve and cap lug incompatibility.
- Special "tamper-proof" fittings.



Slide 5-28

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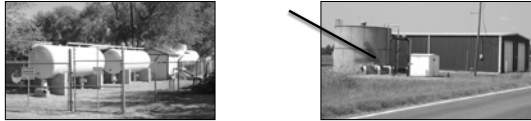
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4. Special "tamper-proof" fittings.

### WATER SUPPLIES (cont'd)

- Small community systems.
  - Require electrical power to operate.
  - Hydrant discharge thread or size incompatibility.
  - Hydrant valve and cap lug incompatibility.
  - May be pipe thread, not National Hose (NH)/National Standard Thread (NST).
  - Overhead fill at department station.



Slide 5-29

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- C. Small community systems — evaluate the type of system you are about to use and ensure that it is compatible for your needs:

1. Require electrical power to operate.
2. Hydrant discharge thread or size incompatibility.
3. Hydrant valve and cap lug incompatibility.
4. May be pipe thread, not National Hose (NH)/National Standard Thread (NST).
5. Overhead fill at department station water faucet above engine company tank in the fire station.

### WATER SUPPLIES (cont'd)

- Private residential wells.
  - May require electricity to operate.
  - Volume of water available.
  - Access to on-site storage.
  - Portable pumps.



Slide 5-30

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D. Private residential wells. If the resident is available, obtain information on using this system.

1. May require electricity to operate.
2. Volume of water available.
3. Access to on-site storage.
4. Portable pumps.

### WATER SUPPLIES (cont'd)

- Rivers, ponds, stock tanks.
  - Quality of water.
  - Drafting.
  - Portable or float pumps.



Slide 5-31

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E. Rivers, ponds and stock tanks.

1. Prior to using a water supply, you need to evaluate the quality of water — sand, silt, algae.
2. If you select drafting as an option — will the pump raise the water to the height required?

3. A good choice is the use of portable or float pumps — however, what do you need, volume or a pressure pump?

**WATER SUPPLIES (cont'd)**

- Dry hydrants.
  - Access to lakes and ponds.
  - Engine must be able to draft.
  - If set up as a supply point, establish recirculation line.



Slide 5-32

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F. Dry hydrants.

1. Do you have access to lakes and ponds in the area?
2. Is your fire engine capable to draft?
3. You may need to consider setting up a supply point by establishing a recirculation line.

**WATER SUPPLIES (cont'd)**

- Water tenders.
  - Communications with Water Supply Group Supervisor or Task Force Leader.
  - Fill points.
  - Delivery points.
  - Designated routing.
  - Bridge weight limits.



Slide 5-33

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G. Water tenders — can be fire department water tenders or public work/private water tenders. Ensure that they are compatible with your equipment.

1. Communications with Water Supply Group Supervisor (consider establishing this position if you are using tenders to shuttle water) or Task Force Leader, if water supply is the mission of the Task Force.

2. Fill points — traffic concerns. Also, consider the location from the fill point to the fire. This can assist in obtaining the right quantity of resources to maintain a continuous water flow at the fire.
3. Delivery points — traffic concerns, especially if using portable tanks.
4. Designated routing — least amount of traffic and minimal curves in roadway.
5. Bridge weight limits versus apparatus weight.

**WATER SUPPLIES (cont'd)**

- Potential water supply assignments.
  - Water shuttle operations.
    - Supports direct attack activities.
    - Supports structural protection activities.
    - Supports engine refill point.
    - Supports helicopter refill point.



Slide 5-34

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H. Potential water supply assignments.

1. Water shuttle operations.
  - a. Supports direct attack activities.
  - b. Supports structural protection activities.
  - c. Supports engine refill point.
  - d. Supports helicopter refill point.

### WATER SUPPLIES (cont'd)

- Potential crew assignments.
  - “Nurse tender.”
    - Supports structural protection activities.
    - Supports engine refill point.



Slide 5-35

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2. “Nurse tender” is a water tender that pumps directly to a fire engine.
  - a. Supports structural protection activities.
  - b. Supports engine refill point.

### WATER SUPPLIES (cont'd)

- Supply point.
  - Must be proficient in drafting operations
  - Must have proper hard-suction hose and strainers.
  - Establish recirculation loop.
  - Keep pump running to eliminate start-up time.
  - Must have communications with Water Supply Group Supervisor.



Slide 5-36

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3. One of the first things you need to do is secure a supply point.
  - a. Must be proficient in drafting operations.
  - b. Must have proper hard-suction hose and strainers.
  - c. Establish recirculation loop.
  - d. Keep pump running to eliminate start-up time.
  - e. Must have communications with Water Supply Group Supervisor.

DVD PRESENTATION

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“BLACK FOREST FIRE  
STRUCTURE PROTECTION”



Slide 5-37

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## ACTIVITY 5.2

### Water Supplies

#### Purpose

To continue with the incident scenario started in Activity 3.1, and extended in Activity 5.1, and include additional water supply operations.

#### Directions

1. Work in your previous two-person groups.
2. Continue to use the resources and assignments from Activity 5.1.
3. Continue to use the ICS forms that were started in Activity 3.1 and updated during Activity 5.1.
4. Read the scenario that is presented on the screen and update your ICS forms.

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V. STRUCTURAL TRIAGE

**STRUCTURAL TRIAGE**

- Similar to medical triage.
  - Classification of “save ability.”
    - Structures not threatened.
    - Structures that are threatened but have the potential of being saved.
    - Structures that are not able to be saved.
    - Structures that are too dangerous to protect.
  - Evaluation of “risk” versus “reward.”
  - Firefighter safety is the primary consideration.

Slide 5-43

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- A. Similar to medical triage, however this is a key factor to the safest and most efficient use of limited firefighting resources.
1. Structures are classified into four types based on their “save ability.”
    - a. Structures not threatened.
    - b. Structures that are threatened but have the potential of being saved.
    - c. Structures that are not able to be saved.
    - d. Structures that are too dangerous to protect.
  2. Evaluation of “risk” versus “reward.”
  3. Firefighter safety is the primary consideration.

**STRUCTURAL TRIAGE (cont'd)**

- Triage possibilities.
  - When there is **little** time.
    - Are occupants gone or on-site?
    - Oncoming intense fire front.
    - Too dangerous for personnel.
    - Defensible space not adequate.
    - Construction type not favorable to effort.
    - No time to prepare.
    - No safety zone possibilities.

Slide 5-44

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- f. No safety zone possibilities.
- g. Do what can be done, and move on.

**STRUCTURAL TRIAGE (cont'd)**

- When there is **adequate** preparation time.
  - Are occupants gone or on-site?
  - Low to moderate immediate fire behavior.
  - Intense fire front some time away.
  - Escape route and safety zone available.
  - Defensible space.
  - Good communications with look-out.
  - Do what can be done and defend structure, or move to the next.

Slide 5-46

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- 3. When there is **adequate** preparation time.
  - a. Are occupants gone or on-site?
  - b. Low to moderate immediate fire behavior.
  - c. Intense fire front some time away.
  - d. Escape route and safety zone available.
  - e. Defensible space.
  - f. Good communications with look-out.
  - g. Do what can be done and defend structure, or move to the next.

**STRUCTURAL TRIAGE (cont'd)**

- When following passage of fire front.
  - Return to location after fire front has passed.
  - Check for victims.
  - Is structure still viable? If not, move on.
  - Check for hot spots on and in the structure, and extinguish.
  - Check for spot fires and extinguish.
  - Re-clear defensible space.

Slide 5-47

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4. When following passage of fire front.
  - a. Return to location after fire front has passed.
  - b. Check for victims.
  - c. Is structure still viable? If not, move on.
  - d. Check for hot spots on and in the structure, and extinguish.
  - e. Check for spot fires and extinguish.
  - f. Re-clear defensible space.

### STRUCTURAL TRIAGE (cont'd)

- Firefighter safety considerations.
  - Safety zone availability.
  - Proximity to fuels.
  - Predicted flame length.
  - Position on slope.
  - Fire behavior.
  - Structural flammability.
  - Time to position resources and prepare structure.



Slide 5-48

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- C. Firefighter safety considerations — as with structural triage, we must also consider firefighter safety if we choose to stay and defend. So, the structure(s) must be evaluated as to:
1. Safety zone availability.
  2. Proximity to fuels.
  3. Predicted flame length.
  4. Position on slope.
  5. Fire behavior.
  6. Structural flammability.
  7. Time to position resources and prepare structure.

**STRUCTURAL TRIAGE (cont'd)**

- Potentially dangerous situations.
  - No safety zone or refuge.
  - No engine safety zone.
  - Extreme fire behavior such as spotting and running.
  - Water supply will not outlast need.
  - Roof more than one-fourth involved.
  - Fire inside the structure.
  - Escape route no longer viable.

Slide 5-49

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- D. Potentially dangerous situations — these conditions must be addressed prior to considering and committing resources to attempt to save a structure(s).
1. No safety zone or refuge for you, your personnel, and any civilian who stayed behind to assist.
  2. No engine safety zone for your engine.
  3. Examine the fire environment for extreme fire behavior, such as spotting and running.
  4. Will the water supply will not outlast your needs?
  5. Is the roof of the structure more than one-fourth involved? If so, move on and save other homes or maybe take a defensive action, if applicable.
  6. Has the fire reached the inside of the structure? Again, move on and save other structures or take a defensive action, if applicable.
  7. Escape route no longer viable. If this is the case, you have no business in this area. This becomes a fire shelter deployment condition and needs to be communicated on the radio as an emergency traffic.

**STRUCTURAL TRIAGE (cont'd)**

- Potentially dangerous access situations.
  - Road surface.
  - Proximity of fuels to road.
  - Turnaround points.
  - Bridge load limits.
  - Grade greater than 15 percent.
  - Angle of approach and departure.
  - Turn-ins/Turnouts and chimneys.



Slide 5-50

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E. Potentially dangerous access situations. Access is a critical safety factor and determines if we can safely get in and protect the structure; but better yet, can we safely get out if conditions warrant our need to do so?

1. Road surface.
2. Proximity of fuels to road.
3. Turnaround points.
4. Bridge load limits.
5. Grade greater than 15 percent.
6. Angle of approach and departure.
7. Turn-ins/Turnouts and chimneys.

**STRUCTURAL TRIAGE (cont'd)**

- Structure and property considerations.
  - Structure size.
  - Exterior wall construction material.
  - Roof construction material.
  - Type of eaves.
  - Large, unprotected windows.
  - Decks and porches.
  - Aboveground fuel tanks.



Slide 5-51

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- F. Structure and property considerations — here, you are looking at the relationship of combustibility of the structural materials and attachments and their proximity to the fire.
  - 1. Structure size.
  - 2. Exterior wall construction material.
  - 3. Roof construction material.
  - 4. Types of eaves.
  - 5. Large, unprotected windows.
  - 6. Decks and porches.
  - 7. Aboveground fuel tanks.

**STRUCTURAL TRIAGE (cont'd)**

- Defensible space of 100 feet.
- Proximity of other structures.
- On-site hazardous materials.
- Overhead power lines.
- On-site water supplies.



Slide 5-52

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- 8. Defensible space of 100 feet.
- 9. Proximity of other structures.
- 10. On-site hazardous materials.
- 11. Overhead power lines.
- 12. On-site water supplies.

VI. STRUCTURAL PREPARATION

**STRUCTURAL PREPARATION**

- Remove fuels.
  - Around structure.
  - Around propane tanks.
  - Around other structures.
  - Ladder fuels.
  - Wooden fences.
  - Wood piles near structure.
- Scatter away from structures.



Slide 5-53

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- A. Remove fuels: Reducing the fuel load adjacent to structures does allow firefighters a better chance in saving the structure.
1. Around structure.
  2. Around propane tanks.
  3. Around other structures.
  4. Ladder fuels (separation within the heights of varying fuels).
  5. Wooden fences.
  6. Wood piles near structure.
- B. Scatter the items mentioned above away from structures. This takes time and personnel to complete and may increase the small fire activity around you when the fire comes. Analyze if it is worth it.

**STRUCTURAL PREPARATION**  
**(cont'd)**

- Use what is available at location.
  - Homeowner’s ladder.
  - Garden hose into engine tank or position strategically around structure.
  - Pump from swimming pool or another source.



Slide 5-54

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- C. Use what is available at the location to assist you in its protection.
1. Homeowner’s ladder can be used to check the attic and or roof.
  2. Garden hose into engine tank or position strategically around structure. Remember to flake it out; if you leave it coiled, an ember can burn through, making the hose useless.
  3. Pump from swimming pool or another source.

**STRUCTURAL PREPARATION**  
**(cont'd)**

- Whatever you commit from your engine, you may have to abandon.

Slide 5-55

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- D. Whatever you commit from your engine, you may have to abandon.

**STRUCTURAL PREPARATION**  
(cont'd)

- Cover vents and air conditioning units.
- Clear leaves, etc. from gutters and roof.
- Close heavy drapes.
- Move porch furniture inside.
- Look for whatever might catch a spark, and remove it.
- Leave the structure unlocked.



Slide 5-56

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- E. Cover vents and air conditioning units.
- F. Clear leaves and other vegetation from gutters and roof.
- G. Close heavy drapes.
- H. Move porch furniture inside.
- I. Look for whatever might catch a spark, and remove it.
- J. Leave the structure unlocked.

**VII. STRUCTURAL PROTECTION**

**STRUCTURAL PROTECTION**

- Resources.
  - One engine for a single structure in an area.
  - One engine for every two structures in a group of structures.
  - Two to three engines per multifamily structure.
  - One tender for each Strike Team.
  - May use dozer or hand crew to help prepare site.

Slide 5-57

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- A. Determining your resource needs to complete the assignment.

1. Consider one engine for a single structure in an area if you have adequate resources.
2. If not, consider one engine for every two structures in a group of structures.
3. Two to three engines per multifamily structure.
4. One water tender for each Strike Team.
5. If you have the opportunity and time, consider the use of dozer(s) or hand crew(s) to help prepare the site.

**STRUCTURAL PROTECTION**  
(cont'd)

- It's structural **protection**, not structural **extinguishment**.
- If it's already burning, move on to something you can potentially save.
  - Interior fire.
  - One quarter or more of roof involved.
  - No time to prepare site.
  - Untrained personnel.

Slide 5-58

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- B. It is structural **protection**, not structural **extinguishment**.
- C. If the structure is already burning, move on to something you can potentially save.
1. Interior fire.
  2. One quarter or more of roof involved.
  3. No time to prepare site.
  4. Untrained personnel.

## STRUCTURAL PROTECTION (cont'd)

- Stay mobile.
  - Identify escape routes and safety zones.
  - Back into driveway.
  - Stay on defined driveways.
  - Flag long driveways so others know you are there.
  - Porch lights turned “on.”



Slide 5-59

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- D. Stay mobile and do not commit a lot of hose and equipment.
1. Identify escape routes and safety zones.
  2. Back into driveway.
  3. Stay on defined driveways.
  4. Flag long driveways so others know you are there.
  5. Porch lights turned “on.”

## STRUCTURAL PROTECTION (cont'd)

- Engine location.
  - Cleared area.
  - Use structure as a shield, if possible.
  - Screens on exterior air cleaners.
  - Overhead dangers.
  - Keep escape route clear.
  - Cover hose loads.
  - Close windows.



Slide 5-60

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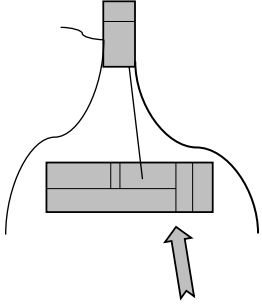
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- E. Be very critical of where your engine is located.
1. Needs to be in a cleared out area.
  2. Use the structure as a shield for your personnel, if possible.

3. Ensure that there are screens on exterior air cleaners.
4. Do not park under areas with overhead wires.
5. Keep your escape route clear and close by in the event you have to use them.
6. Cover hose loads, so embers do not land on the hose and burn through them.
7. Close windows in your apparatus.

**STRUCTURAL PROTECTION**  
(cont'd)

- Operations.
  - Keep hoselays short.
  - One line to each side.
  - One toward fire.
  - One line to roof.
  - Short line to protect engine.
  - Keep at least 100 gallons in tank.



Slide 5-61

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- F. Operations — keep your tactics simple in the event that you have to pick up and leave.
1. Keep hoselays short.
  2. One hoseline to each side of the structure.
  3. One hoseline toward fire front.
  4. One line to roof, especially on combustible roofs.
  5. Have the engineer lay a short line to protect the engine.

**STRUCTURAL PROTECTION**  
(cont'd)

- Engine protection.
- Drafting start up.
- Water ejector (Venturi Siphon).

Slide 5-62

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6. The rule of thumb is to keep at least 100 gallons in engine's water tank.

**STRUCTURAL PROTECTION**  
(cont'd)

- Remember Watch Out Situation No. 10.
  - Attempting a frontal assault on the fire.

Slide 5-63

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G. Remember Watch Out Situation No. 10: attempting a frontal assault on the fire. Even though we have singled out Watch Out Situation No. 10, it is imperative that you know all of the 10 Standard Firefighting Orders and the 18 Watch Out Situations. Be sure you and your crew are following them.

## STRUCTURAL PROTECTION (cont'd)

- Maintain an awareness of the structure.
  - Keep a constant watch for new fires.
    - Eaves.
    - Porches and steps.
    - Window frames.
    - Attic vents.
    - Vehicles.
    - Spot fires in grasses.
    - Other structures.
  - Extinguish quickly!



Slide 5-64

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H. Maintain an awareness of the structure and its combustibility by watching the following:

1. Keep a constant watch for new fires.
  - a. Eaves.
  - b. Porches and steps.
  - c. Window frames.
  - d. Attic vents.
  - e. Vehicles.
  - f. Spot fires in grasses.
  - g. Other structures.
2. Extinguish quickly!

## STRUCTURAL PROTECTION (cont'd)

- Operations.
  - Structures can possibly be used as a safety zone.
  - Keep in communication with supervisors.
  - Keep log of actions.
    - Time.
    - Location.
    - Defend/Write off.



Slide 5-65

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3. Structures can possibly be used as a safety zone.
4. Keep in communication with supervisors.
5. Keep log of actions.
  - a. Time.
  - b. Location.
  - c. Defend/Write off.

## STRUCTURAL PROTECTION (cont'd)

- If you have to leave in a hurry, be sure to:
  - Communicate with your crew.
    - Shift in fire direction or intensity.
    - Many spot fires erupting.
    - Other engines leaving area.
    - Let others know your situation.
    - Lookouts important.

Slide 5-66

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- I. If you have to leave in a hurry, be sure to communicate with your crew and the crews working with you.
  1. Shift in fire direction or intensity.
  2. Many spot fires erupting.


3. Other engines leaving area.
4. Let others know your situation.
5. Lookouts are important. Again, make sure that you have an escape route and an adequately sized safety zone.

**VIII. MOP UP AND PATROL**

**MOP UP AND PATROL**

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- Mop up the fire.
  - Equivalent to overhaul in structural firefighting.
  - Objective is to eliminate potential restarts.
  - Usually started as soon as fire front has passed.
  - Extinguish or remove fuel.



Slide 5-67

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- A. Mop up the fire.
1. Equivalent to overhaul in structural firefighting.
  2. Objective is to eliminate potential restarts.
  3. Usually started as soon as fire front has passed.
  4. Extinguish or remove fuel.

**MOP UP AND PATROL (cont'd)**

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- Mop up.
  - Check ember “catch points” of structure.
    - Window and door frames.
    - Roof valleys and gutters.
    - Decks and porches.
    - Surrounding vegetation.
    - Other exposures.
    - Anyplace.



Slide 5-68

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- 5. Check ember “catch points” of structure.
  - a. Window and door frames.
  - b. Roof valleys and gutters.
  - c. Decks and porches.
  - d. Surrounding vegetation.
  - e. Other exposures.
  - f. Anyplace.

**MOP UP AND PATROL (cont'd)**

- Watch for new hazards.
  - Damage to natural gas or propane lines.
  - Downed power lines.
  - Pressurized tanks.
  - Snags.
  - Damaged structures.
  - Other new hazards.



Slide 5-69

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- 6. When mopping up and/or conducting fire patrol operations, watch for new hazards.
  - a. Damage to natural gas or propane lines.
  - b. Downed power lines.
  - c. Pressurized tanks.
  - d. Snags (dead trees).
  - e. Damaged structures.
  - f. Other new hazards.

### MOP UP AND PATROL (cont'd)

- Conserve water.
  - Combination of tools and water.
  - Wet it, mix it, wet it, mix it.
  - Scrape charring with Pulaski or shovel, then wet it.
  - Use "Class A" additive.



Slide 5-70

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7. Conserve water.
  - a. Combination of tools and water.
  - b. Wet it, mix it, wet it, mix it.
  - c. Scrape charring with Pulaski or shovel, then wet it.
  - d. Use Class "A" additive.

### MOP UP AND PATROL (cont'd)

- Establish a fire patrol.
  - Following the fire front passage.
    - Still a risk to structures.
    - Check all areas of structures, inside and out.
    - Look for smoldering areas that could expand.
    - Patrol downwind where embers may have blown.
    - Look for potential flare-ups in new fuels.
    - Be aware of new hazards caused by fire conditions.
    - Communications.

Slide 5-71

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- B. Be sure to establish a fire patrol.
  1. Following the fire front passage.
    - a. Still a risk to structures.
    - b. Check all areas of structures, inside and out.

- c. Look for smoldering areas that could expand.
- d. Patrol downwind where embers may have blown.
- e. Look for potential flare-ups in new fuels.
- f. Be aware of new hazards caused by fire conditions.
- g. Communications.

**MOP UP AND PATROL (cont'd)**

- Systematic search.
- Continued over time.
- Hot spot indicators.
  - Smoke wisps.
  - Collection of flies or gnats.
  - Holes in foam blankets.
- Thermal imagers and laser thermometers.



Slide 5-72

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- 2. Systematic search.
- 3. Continued over time.
- 4. Hot spot indicators of a potential flare-up of the fire or reignition. Common indicators are:
  - a. Smoke wisps.
  - b. Collection of flies or gnats.
  - c. Holes in foam blankets.
- 5. Thermal imagers and laser thermometers.

**DVD PRESENTATION**

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**“SMOLDERING FIRE MOP-UP”**



Slide 5-73

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**IX. PREFIRE PREPARATION AND MITIGATION**

**PREFIRE PREPARATION AND MITIGATION**

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- What civilians can do.
  - Homeowner education programs.
    - Local department presentations.
    - Firewise or other state and regional programs.
    - National Fire Protection Association (NFPA), International Association of Fire Chiefs (IAFC), and National Fire Academy (NFA) printed materials.
  - Open space user education programs.
    - Smoking and safe use of fire.
    - Fire danger levels.

Slide 5-74

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- A. What civilians can do in preparation for a WUI.
  - 1. Homeowner education programs.
    - a. Local department presentations.
    - b. Firewise program.
    - c. National Fire Protection Association (NFPA), International Association of Fire Chiefs (IAFC) and National Fire Academy (NFA) printed materials.
  - 2. Open space user education programs.
    - a. Smoking.

- b. Safe use of fire.
- c. Fire danger levels.

**PREFIRE PREPARATION AND MITIGATION (cont'd)**

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- What firefighters need to do.
  - Participate in wildland and WUI training.
  - Have proper equipment, departmental and personal.
  - Be physically and mentally ready.
  - Obtain and renew Red Card status.
  - Think situational awareness and safety!

Slide 5-75

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- B. What firefighters need to do in preparation for WUI.
1. Participate in wildland and WUI training.
  2. Have proper equipment, departmental and personal.
  3. Be physically and mentally ready.
  4. Obtain and renew Red Card (ICS qualifications) status or follow your state guidelines on your ICS certification and qualification.
  5. Think situational awareness and safety!

**X. SUMMARY**



**SUMMARY**

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- Mutual aid.
- Covering other stations.
- Evacuation and rescue.
- Water supply.
- Structural triage.

Slide 5-76

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## SUMMARY (cont'd)



- Structural preparation.
- Structural protection.
- Mop up and patrol.
- Prefire preparation and mitigation.

Slide 5-77

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# **APPENDIX**

## **PAST MAJOR FIRES WITH MULTIPLE LINE-OF-DUTY DEATHS**

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### **Past Major Fires with Multiple Line-of-duty Deaths**

Oct. 3, 1933: The Griffith Park wildfire in Los Angeles killed 29 firefighters. Tuesday, Oct. 3, was a day without fog, and the early sun combined with a dry wind from the desert. By noon, the Los Angeles Civic Center reported a temperature of 100 degrees. By now, the Los Angeles City Fire Department had arrived. Fire Chief Ralph Scott said his men found an estimated 40-acre fire area that included Mineral Wells Canyon. Around 3 p.m., the wind, which had been blowing gently and steadily down the canyons from the northwest, shifted. The fire advanced quickly, taking them by surprise. Men scrambled madly up the canyon wall, trying to outrun the advancing flames. It was all over inside of seven minutes.

In August 1949, 15 smokejumpers parachuted in to Mann Gulch, north of Helena, Montana, to fight a wildfire started by lightning. The wind picked up and caused the fire to spread to thousands of acres in just 10 minutes, forcing the men to drop their gear and race for their lives up the steep slope to the ridge. Twelve smokejumpers and a Helena National Forest fire guard died after being overtaken by the fire. Their story was memorialized by Norman Maclean, the author of "A River Runs Through It," in the book "Young Men and Fire."

July 9, 1953: The Rattlesnake fire in northern California took the lives of 15 firefighters battling a blaze in Mendocino National Forest.

June 26, 1990: The rapidly spreading Dude fire in the Tonto National Forest near Payson in eastern Arizona trapped 11 firefighters, killing six of them.

July 6, 1994: A blaze near Glenwood Springs, Colorado, killed 14 firefighters who were overtaken by a sudden explosion of flames. The lightning-sparked Storm King Mountain blaze roared through shrubs as the firefighters scrambled uphill. Thirty-five firefighters on the mountain that day survived.

July 10, 2001: Four firefighters died in their emergency fire shelters when a wildfire trapped them in a north-central Washington canyon. Ten other firefighters and two campers survived, but a Forest Service investigation later found that fire bosses had broken all 10 of the agency's standard safety rules and ignored numerous signs of danger that day.

Oct. 26, 2006: Five firefighters assigned to San Bernardino National Forest Engine 57 were fatally burned when fierce Santa Ana winds blew the Esperanza Fire over their structure-protection position at Twin Pines in the San Jacinto Mountains.

June 30, 2013: Nineteen members of an elite crew were killed in a fire northwest of Phoenix that lit up the night sky in the forest above the town of Yarnell. The fast-moving blaze was fueled by hot, dry conditions.

## Lessons Learned

Never underestimate the importance of communications — emergency and nonemergency communications are critical to the successful outcome of most every incident. No crew should operate in a hazardous environment (Immediately Dangerous to Life and Health (IDLH) or otherwise) without a means of communications directly linking themselves with the incident commander and/or division/group supervisor.

Crew continuity — crews who routinely work together are typically safer. Knowing the skills and capabilities of your crewmembers is absolutely critical.

Firefighter survival training — no crewmember(s) should be deployed into an IDLH environment without some form of survival training. While Dodge's escape fire has proven to be a successful tactic today, exploratory tactics in high-stress situations are seldom successful. The key to survival is training for worst-case scenarios prior to the event.

Never underestimate the risk — some of the most tragic incidents we respond to are initially described as routine incidents. Firefighters should never treat an uncontrolled incident as routine. Always exercise due caution, and never let your guard down.

Situational awareness — the key to maintaining situational awareness is ongoing reconnaissance. Crews must use all available resources to identify the critical factors related to a fire — current size (How big is the fire?), topography (What's the layout of the land? Do we have an escape route?), weather conditions (current and forecasted), available resources (on-scene and requested), etc.

Fireground forecasting/Cue-based decision-making — all firefighters should understand and practice fireground forecasting and cue-based decision-making (look for cues of rapid fire development: wind, low humidity, high temperatures, sloping topography, dense to sparse vegetation, etc.). Always be a student of fire behavior.

Whether you're a wildland firefighter, a structural firefighter, or simply a student of the fire service, the Mann Gulch Fire provides lessons to be learned by us all. For more detailed coverage of the Mann Gulch incident, Norman Maclean's book, "Young Men and Fire," this is readily available in most bookstores throughout the country, and is a **must read** for all firefighters and aspiring officers.

# GLOSSARY/ACRONYMS

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## GLOSSARY

<b>Aerial Fuels</b>	All live and dead vegetation located in the forest canopy or above the surface fuels, including tree branches and crowns, snags, moss and high brush.
<b>Anchor Point</b>	An advantageous location or point, usually a barrier to fire spread, from which to start constructing a fire line. It is used to minimize the chance of being flanked by the fire while the line is being constructed.
<b>Area Ignition</b>	Igniting, throughout an area to be burned, several individual fires, either simultaneously or in rapid succession, spaced so that they soon influence and support each other to produce a hot, fast-spreading fire throughout the area. Also called simultaneous ignition.
<b>Aspect</b>	The direction that a slope is facing (i.e., its exposure in relation to the sun).
<b>Available Fuels</b>	Those fuels that will burn during a passage of a flaming front under specific burning and fuel conditions.
<b>Backfiring</b>	When attack is indirect, intentionally setting fire to fuels inside the control line to contain a fire. Backfiring is a tactic that makes possible a strategy of locating control lines at places advantageous to the firefighter.
<b>Barrier</b>	Any obstruction to the spread of fire, typically an area or strip devoid of flammable fuel.
<b>Blackline Concept</b>	Fuels that remain between the main fire and a fire line are burned out to ensure the safety of control forces and security of control lines.
<b>Brush Fire</b>	A fire burning in vegetation that is predominately shrubs, brush and scrub growth.
<b>Burning Out</b>	Conducted when attack is direct, or parallel, and the control line touches points of the fire. Burning out is intentionally setting fire to fuels inside the control line to strengthen the line. Burning out is almost always done by the crew boss as a part of line construction. The control line is considered incomplete unless there is no fuel between the fire and the control line.

<b>Burning Period</b>	That part of each 24-hour period when fires will spread most rapidly. Typically, this is from about midmorning to about sundown or late afternoon.
<b>Canopy</b>	The stratum containing the crowns of the tallest vegetation present (living or dead), usually above 20 feet.
<b>Celsius</b>	A temperature scale with 0 C as the melting point of ice and 100 C as the boiling point of water.
<b>Chain</b>	A measuring instrument consisting of 100 wire links, each 7.92 inches long, totaling 792 inches or 66 feet.
<b>Chinook or Chinook Wind</b>	A foehn wind blowing down the eastern slopes of the Cascades, Rocky Mountains, and over the adjacent plains in the United States and Canada. In winter, this warm, dry wind causes snow to disappear with remarkable rapidity; hence, it has been nicknamed the “snoweater.” In hot, dry weather, Chinook winds can quickly extend fire weather conditions to the “extreme.”
<b>Cirrus</b>	A form of high cloud composed of ice crystals that often does not obscure the sun.
<b>Climate</b>	The prevalent or characteristic meteorological conditions of any place or region and their extremes.
<b>Cloud</b>	A visible cluster of minute water and/or ice particles in the atmosphere above the earth’s surface.
<b>Cold Front</b>	The leading edge of a relatively cold air mass that displaces warmer air. The heavier cold air may cause some of the warm air to be lifted. If the lifted air contains enough moisture, cloudiness, precipitation and even thunderstorms may result. In case both air masses are dry, there may be no cloud formation. Following a cold front passage (in the Northern Hemisphere), often westerly or northwesterly winds of 10 to 20 miles per hour (mph), or more, continue for 12 to 24 hours.
<b>Combustion</b>	The rapid oxidation of combustible materials that produces heat energy.
<b>Combustion Period</b>	Total time required for a specified fuel component to be completely burned.

<b>Compactness</b>	The spacing between fuel particles. This can be especially important in the surface layer of fuels, where the amount of air circulation affects rate of drying, rate of combustion, etc.
<b>Condensation</b>	The process by which a vapor becomes a liquid.
<b>Conduction</b>	The transfer of heat between molecules in contact with one another.
<b>Conflagration</b>	A raging, destructive fire. Often used to denote such a fire with a moving front as distinguished from a fire storm.
<b>Continuity of Fuels</b>	The proximity of fuels to each other that governs the fire's capability to sustain itself. This applies to aerial fuels as well as surface fuels.
<b>Contour Map</b>	A map having lines of equal elevation that represent the land surface.
<b>Control Line</b>	An inclusive term for all constructed or natural fire barriers and treated fire edges used to control a fire.
<b>Control Line Standards</b>	The depth and width to which fuels must be treated or removed to control any portion of a wildfire perimeter.
<b>Convection</b>	Vertical air movements resulting in the transport of atmospheric properties. In meteorology, atmospheric motions that are predominantly vertical, in other words usually upward.
<b>Convection Column</b>	The thermally produced ascending column of gases, smoke and debris produced by a fire.
<b>Convective Winds</b>	All winds, up, down or horizontal, that have their principal origins in local temperature differences.
<b>Creeping</b>	Fire burning with a low flame and spreading slowly.
<b>Crown Closure</b>	The spacing between tree crowns, usually expressed as the percent of area covered by tree crowns in the forest canopy region as viewed from above.
<b>Crown Fire</b>	A fire that advances from top to top of trees or shrubs. Crown fires are classed as passive, active or dependent in order to distinguish the degree of dependence on the surface fire.

<b>Cumulonimbus</b>	The ultimate growth of a cumulus cloud into an anvil shape with considerable vertical growth, usually fibrous ice crystal tops, and probably accompanied by lightning, thunder, hail and strong winds.
<b>Cumulus</b>	A principal, low cloud type in the form of individual cauliflower-like cells of sharp, nonfibrous outline and with less vertical development than cumulonimbus.
<b>Defensible Space</b>	A fuel break adjacent to improvements in which you can safely defend improvements.
<b>Dew Point</b>	The temperature to which air must be cooled, at constant pressure and moisture content, in order for saturation to occur.
<b>Direct Attack</b>	A method of suppression that treats the fire, or all its burning edge, as a whole by wetting, cooling, smothering, or chemically quenching it or mechanically separating it from unburned fuel.
<b>Diurnal</b>	Daily, especially pertaining to cyclic actions which are completed within 24 hours and which recur every 24 hours.
<b>Dry Bulb</b>	A name given to an ordinary thermometer used to determine the temperature of the air (to distinguish it from the wet bulb).
<b>Dry Lightning Storm</b>	A lightning storm with negligible precipitation reaching the ground.
<b>Duff</b>	A mat of partially decomposed organic matter immediately above the mineral soil, consisting primarily of fallen foliage, herbaceous vegetation, and decaying wood (twigs and small limbs).
<b>Eddy</b>	A whirl or circling current of air or water, different and differentiated from the general flow.
<b>Elevation</b>	The height of the terrain above mean sea level, usually expressed in feet.
<b>Equilibrium Moisture Content</b>	The level at which dead fuels neither gain nor lose moisture with time, under specific constant temperature and humidity. The water vapor pressure in the air is equal to the vapor pressure in the fuel. A fuel particle at EMC will have no net exchange of moisture with its environment.

<b>Equilibrium Vapor Pressure</b>	Occurs when there is no net gain or loss of water molecules between the air and a solid or liquid.
<b>Evaporation</b>	The transformation of a liquid to the gaseous state. Heat is lost by the liquid during this process.
<b>Extreme Fire Behavior</b>	Implies a level of wildfire behavior characteristics that ordinarily precludes methods of direct control action. One or more of the following is usually involved: high rates of spread, prolific crowning and/or spotting, presence of firewhirls, and a strong convection column. Predictability is difficult because such fires often exercise some degree of influence on their environment, behaving erratically and sometimes dangerously.
<b>Fahrenheit</b>	A temperature scale on which 32 F denotes the temperature of melting ice and 212 F denotes the temperature of boiling water, both under standard atmospheric pressure.
<b>Fine Fuels</b>	Fuels that are less than one-fourth of an inch in diameter, such as grass, leaves, draped pine needles, fern, tree moss, and some kinds of slash that, when dry, ignite readily and are consumed rapidly. (Also called flash fuels.)
<b>Fire Line</b>	The part of a control line that is scraped or dug to mineral soil. Sometimes called fire trail.
<b>Fire Perimeter</b>	The entire outer edge or boundary of a fire.
<b>Fire Storm</b>	Violent convection caused by a large continuous area of intense fire. Often characterized by destructively violent surface indrafts near and beyond the perimeter and sometimes by tornado-like whirls.
<b>Firebrand</b>	Any source of heat, natural or man-made, capable of igniting wildland fuels. Flaming or glowing fuel particles that can be carried naturally by wind, convection currents or gravity into unburned fuels.
<b>Firebreak</b>	A natural or constructed barrier used to stop or check fires that may occur, or to provide a control line from which to work.
<b>Firewhirl</b>	A spinning, moving column of ascending air which carries aloft smoke, debris and flames. These range in size and intensity from a foot or two in diameter to small tornadoes.

<b>Firing Out</b>	Also called firing. The act of setting fire to fuels between the control line and the main fire in either a backfiring or burning-out operation.
<b>Flanking</b>	Attacking a fire by working along the flanks, either simultaneously or successively, from a less active or anchor point and endeavoring to connect the two lines at the head.
<b>Flanks of a Fire</b>	The parts of a fire's perimeter that are roughly parallel to the main direction of spread.
<b>Flare-up</b>	Any sudden acceleration of fire spread or intensification of the fire. Unlike a blowup, a flare-up is of relatively short duration and does not radically change existing control plans.
<b>Flash Fuels</b>	Fuels, such as grass, leaves, draped pine needles, fern, tree moss, and some kinds of slash, that ignite readily and are consumed rapidly when dry. (Also called fine fuels.)
<b>Flashover</b>	Rapid combustion and/or explosion of unburned gases trapped at some distance from the main fire front. Usually occurs only in poorly ventilated topography. More commonly associated with structural fire behavior.
<b>Foehn</b>	(Pronounced "fern.") A type of general wind that occurs when stable, high-pressure air is forced across and then down the lee slopes of a mountain range. The descending air is warmed and dried due to adiabatic compression. Locally called by various names, such as Santa Ana, Mono, Chinook, etc.
<b>Fog</b>	A cloud at or near the earth's surface. Fog consists of numerous droplets of water, which individually are so small that they cannot be distinguished readily by the naked eye.
<b>Front</b>	The transition zone between two different air masses.
<b>Frost</b>	Crystals of ice formed and deposited like dew but at a temperature below freezing.
<b>Fuel Break</b>	A wide strip or block of land on which the native or pre-existing vegetation has been modified permanently so that fires burning into it can be extinguished more readily. It may or may not have fire lines constructed in it prior to fire occurrence.
<b>Fuel Moisture Content</b>	The amount of water in a fuel, expressed as a percentage of the "oven-dry" weight of that fuel.

<b>General Winds</b>	Large-scale winds caused by high- and low-pressure systems but generally influenced and modified in the lower atmosphere by terrain.
<b>Gradient Wind</b>	A wind that flows parallel to the isobars or contours and has a velocity such that the pressure gradient, Coriolis, and centrifugal forces acting in the area are in balance. It does not occur at the earth's surface due to frictional influence, but it occurs at a height of roughly 1,500 feet above mean terrain height. Nearly synonymous with "free air" winds.
<b>Ground Fuels</b>	All combustible materials lying beneath the ground surface, including deep duff, roots, rotten buried logs, peat and other woody fuels.
<b>Gust</b>	A sudden, brief increase in the speed of the wind.
<b>Head of a Fire</b>	The most rapidly spreading portion of a fire's perimeter, usually to the leeward or upslope.
<b>Heavy Fuels</b>	Fuels of large diameter such as snags, logs and large-limb wood that ignite and are consumed much more slowly than flash fuels. (Also called coarse fuels.)
<b>High</b>	An area of relatively high atmospheric pressure that has a more or less closed circulation, also known as an anti-cyclone. Winds around a high move clockwise in the Northern Hemisphere, while spiraling out from the high toward lower pressure.
<b>Horizontal Continuity</b>	The horizontal distribution of fuels at various levels or planes.
<b>Hotspotting</b>	Checking the spread of fire at points of more rapid spread or special threat. It is usually the initial step in prompt control, with emphasis on first priorities.
<b>Humidity</b>	The measure of water vapor content in the air.
<b>Ignition</b>	The initiation of combustion.
<b>Indirect Attack</b>	A method of suppression in which the control line is mostly located along natural firebreaks, favorable breaks in topography, or at considerable distance from the fire, and all intervening fuel is backfired or burned out. The strip to be backfired is wider than in the parallel method and usually allows for a choice of the time when burnout or backfiring will be done.

<b>Insolation</b>	Solar radiation received at the Earth's surface.
<b>Instability</b>	A state of the atmosphere in which the vertical distribution of temperature is such that an air particle, if given either an upward or downward impulse, will tend to move vertically away with increasing speed from its original level (unstable air).
<b>Interface</b>	The line, area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.
<b>Inversion</b>	A layer in the atmosphere where the temperature increases with altitude.
<b>I-Zone</b>	See interface.
<b>Ladder Fuels</b>	Fuels that provide vertical continuity between strata. Fire is able to carry from surface fuels by convection into the crowns with relative ease.
<b>Land Breeze</b>	A light nighttime breeze that originates over the relatively cool land surface and flows out over the warmer coastal waters.
<b>Lightning</b>	A sudden, visible flash of energy and light caused by electrical discharges from thunderstorms.
<b>Litter</b>	The uppermost layer of loose debris, composed of freshly fallen or slightly decomposed organic materials, such as dead sticks, branches, twigs, and leaves or needles.
<b>Local Winds</b>	Small-scale convective winds of local origin caused by temperature differences.
<b>Long-range Spotting</b>	Large, glowing firebrands are carried high into the convection column and then fall out downwind beyond the main fire, starting new fires. Such spotting can easily occur 1/4 mile or more from the firebrands' source.
<b>Low</b>	An area of relatively low atmospheric pressure in which winds tend to move in a counterclockwise direction, spiraling in toward the low's center.
<b>Precipitation</b>	The collective name for moisture in either liquid or solid form that is large enough to fall from the atmosphere and reach the Earth's surface.

<b>Pressure Gradient</b>	The change in atmospheric pressure per unit of horizontal distance.
<b>Psychrometer</b>	An instrument for measuring atmospheric temperature and humidity, consisting of a dry-bulb thermometer and a wet-bulb thermometer (bulb covered with a muslin wick); used in the calculation of dew point and relative humidity.
<b>Rainfall</b>	A term sometimes synonymous with rain, but most frequently used in reference to amounts of precipitation (including snow, hail, etc.).
<b>Rain Gauge</b>	An instrument for measuring precipitation.
<b>Rate of Spread</b>	The relative activity of a fire in extending its horizontal dimensions. It is expressed as rate of increase of the total perimeter of the fire, or as rate of forward spread of the fire front, or as rate of increase in area, depending on the intended use of the information. Usually its (forward) rate of spread is expressed in chains or acres per hour.
<b>Reburn</b>	(1) Subsequent burning of an area in which fire has burned previously but has left flammable fuel that ignites when burning conditions are more favorable. (2) An area that has reburned.
<b>Red Flag Warning</b>	An ongoing or imminent critical fire weather pattern or condition. The “warning” is provided by the National Weather Service (NWS) to weather forecast users to alert wildland fire services of conditions conducive to extreme fire behavior.
<b>Relative Humidity</b>	The ratio of the amount of moisture in the air to the amount that the air could hold at the same temperature and pressure if it were saturated, usually expressed in percent.
<b>Resistance to Control</b>	The relative difficulty of constructing and holding a control line as affected by resistance to line construction and fire behavior. (Also called difficulty of control.)
<b>Ridge</b>	An elongated area of relatively high pressure extending from the center of a high-pressure region.

<b>Roll Cloud</b>	A turbulent altocumulus-type cloud formation found in the lee of some large mountain barriers. The air in the cloud rotates around an axis parallel to the range. Also, sometimes refers to part of the cloud base along the leading edge of a cumulonimbus cloud; it is formed by rolling action in the wind shear region between cool downdrafts within the cloud and warm updrafts outside the cloud. (Sometimes called rotor cloud.)
<b>Running</b>	Behavior of a fire that is spreading rapidly, usually with a well-defined head.
<b>Safety Island</b>	An area for escape in the event the line is outflanked or in case a spot fire causes fuels outside the control line to render the line unsafe. In firing operations, crews progress so as to maintain a safety island close at hand, allowing the fuels inside the control line to be consumed before going ahead.
<b>Saturated Air</b>	Air that contains the maximum amount of water vapor it can hold at a given pressure and temperature (relative humidity of 100 percent).
<b>Scratch Line</b>	An unfinished preliminary control line, hastily established or constructed as an emergency measure to check or slow the spread of a fire.
<b>Size and Shape</b>	Fuel characteristics affecting the fuel moisture time lag, the amount of heat required for ignition and to sustain combustion, and the burnout time of fuels. The surface-area-to-volume ratio is a representation of size and shape.
<b>Slash</b>	Debris left after logging, pruning, thinning or brush cutting; also, debris resulting from thinning, wind or fire. It may include logs, chunks, bark, branches, stumps, and broken understory trees or brush.
<b>Slope Winds</b>	Small-scale convective winds that occur due to local heating and cooling of a natural incline of the ground.
<b>Slope Percent</b>	The ratio between the amount of vertical rise of a slope and horizontal distance as expressed in a percent. A rise of 100 feet to a horizontal distance of 100 feet equals 100 percent.
<b>Smoldering</b>	Behavior of a fire burning without flame and barely spreading.

<b>Snag</b>	A standing dead tree or part of a dead tree from which at least the leaves and smaller branches have fallen. (Often called stub if less than about 20 feet tall.)
<b>Spot Fire</b>	Fire set outside the perimeter of the main fire by flying (or rolling) sparks or embers.
<b>Spotting</b>	Behavior of a fire producing sparks or embers that are carried by convection columns and/or the wind and which start new fires beyond the zone of direct ignition by the main fire.
<b>Stability</b>	A state of the atmosphere in which the vertical distribution of temperature is such that an air particle will resist vertical displacement from its level (stable air).
<b>State of Weather</b>	A brief description of current weather that expresses the amount of cloud cover, kind of precipitation, and/or restrictions to visibility being observed at a weather observation site.
<b>Subsidence</b>	An extensive sinking motion of air in the atmosphere, most frequently occurring in polar highs. The subsiding air is warmed by compression and becomes more stable. Of particular importance due to the heating and drying of the air, it is often the cause of very rapid drying of fuels in the smaller size classes.
<b>Suppress a Fire</b>	To extinguish a fire or confine the area it burns within fixed boundaries.
<b>Surface-area-to-volume Ratio</b>	The ratio of the surface area of a fuel to its volume, using the same linear unit for measuring volume; the higher the ratio, the finer the particle.
<b>Surface Fire</b>	A fire that burns surface litter, debris and small vegetation.
<b>Surface Fuels</b>	All materials lying on, or immediately above, the ground, including needles or leaves, duff, grass, small dead wood, downed logs, stumps, large limbs, low brush, and reproduction.
<b>Surface Wind</b>	The wind measured 20 feet above the average top of the vegetation. It is often a combination of local and general winds.
<b>Temperature</b>	A measure of the degree of hotness or coldness of a substance.
<b>Temperature Lapse Rate</b>	The amount of temperature change with altitude change, expressed as degrees Fahrenheit per 1,000 feet of rise or fall.

<b>Thermal Belt</b>	An area of a mountainous slope that typically experiences the least variation in diurnal temperatures, has the highest average temperatures, and thus, has the lowest average relative humidity.
<b>Thermometer</b>	An instrument for measuring temperature; in meteorology, it generally measures the temperature of the air.
<b>Thunder</b>	The sound emitted by rapidly expanding gases along the channel of a lightning discharge.
<b>Thunderstorm</b>	A storm invariably produced only by a cumulonimbus cloud and always accompanied by lightning and thunder; it is usually attended by strong wind gusts, heavy rain, and sometimes hail. It is usually of short duration, seldom over 2 to 3 hours for any one storm.
<b>Topography</b>	The configuration of the Earth's surface, including its relief and the position of its natural and man-made features.
<b>Torching</b>	Fire burning principally as a surface fire that intermittently ignites the crowns of trees or shrubs as it advances.
<b>Vertical Arrangement</b>	The relative heights of fuels above the ground and their vertical continuity, which influences fire reaching various levels or strata. (Surface fuels versus aerial fuels and their relationships to one another.)
<b>Vertical Development of Column</b>	Depending on fire intensity and atmospheric conditions, the smoke or convection column might rise a hundred feet or many thousands of feet. A low-intensity fire with a low smoke column might be termed "two-dimensional," whereas a high-intensity fire with a well-developed convection column rising thousands of feet into the atmosphere can be termed a "three-dimensional" fire. (See Convection Column.)
<b>Virga</b>	Wisps or streaks of water or ice particles falling out of a cloud but evaporating before reaching the earth's surface.
<b>Visibility</b>	The greatest distance that prominent objects can be seen and identified by unaided, normal eyes. (Usually expressed in miles or fractions of a mile.)
<b>Warm Front</b>	The discontinuity at the forward edge of an advancing current (or mass) of relatively warm air that is displacing a retreating, colder air mass.

<b>Weather</b>	The short-term variations of the atmosphere in terms of temperature, pressure, wind, moisture, cloudiness, precipitation and visibility.
<b>Wet-bulb Temperature</b>	The lowest temperature to which air can be cooled by evaporating water into it at a constant pressure when the heat required for evaporation is supplied by the cooling of the air. It is measured by the wet-bulb thermometer, which usually employs a wetted wicking on the bulb as a cooling (through evaporation) device.
<b>Wet Line</b>	A fire control line, usually temporary, prepared by treating the fuels with water and/or chemicals, which will halt the spread of the fire.
<b>Wildfire</b>	An unplanned wildland fire requiring suppression action, or other action according to agency policy, as contrasted with a prescribed fire burning within prepared lines enclosing a designated area, under prescribed conditions. A free-burning wildfire unaffected by fire suppression measures.
<b>Wildland Fuels</b>	Any organic material, living or dead, in the ground, on the ground, or in the air that will ignite and burn.
<b>Wildland Urban Interface</b>	See interface.
<b>Wind</b>	The horizontal movement of air relative to the surface of the earth.
<b>Wind-driven Wildfire</b>	A wildland fire that is controlled by a strong, consistent wind.
<b>Windspeed Meter</b>	A handheld device that indicates wind speed, usually in miles per hour.

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## ACRONYMS

<b>AAR</b>	After-Action Review
<b>AHJ</b>	authority having jurisdiction
<b>CAR</b>	Company Accountability Reports
<b>CO</b>	Company Officer
<b>CP</b>	Command Post
<b>CTCSS</b>	Continuous Tone-Coded Squelch System
<b>EMC</b>	Equilibrium Moisture Content
<b>EMS</b>	Emergency Medical Services
<b>ETA</b>	estimated time of arrival
<b>FEMA</b>	Federal Emergency Management Agency
<b>FOG</b>	ICS Field Operations Guide
<b>gpm</b>	gallons per minute
<b>GPS</b>	global positioning system
<b>HAMS</b>	Amateur Radio Operators (nickname)
<b>IAFC</b>	International Association of Fire Chiefs
<b>IAP</b>	Incident Action Plan
<b>IC</b>	Incident Commander
<b>ICP</b>	Incident Command Post
<b>ICS</b>	Incident Command System
<b>IDLH</b>	Immediately Dangerous to Life and Health
<b>IG</b>	Instructor Guide
<b>IMT</b>	Incident Management Team

<b>LCES</b>	Lookouts, Communications, Escape routes and Safety zones
<b>LODDs</b>	line-of-duty deaths
<b>MHz</b>	megahertz
<b>mph</b>	miles per hour
<b>NFA</b>	National Fire Academy
<b>NFIRS</b>	National Fire Incident Reporting System
<b>NFPA</b>	National Fire Protection Association
<b>NH</b>	National Hose
<b>NIFC</b>	National Interagency Fire Center
<b>NIMS</b>	National Incident Management System
<b>NST</b>	National Standard Thread
<b>NWCG</b>	National Wildfire Coordinating Group
<b>OSC</b>	Operations Section Chief
<b>OSHA</b>	Occupational Safety and Health Administration
<b>PA</b>	public announcement
<b>PAR</b>	Personnel Accountability Reports
<b>PIO</b>	Public Information Officer
<b>PPE</b>	personal protective equipment
<b>PSC</b>	Planning Section Chief
<b>RACES</b>	Radio Amateur Civil Emergency Services
<b>RESL</b>	Resource Unit Leader
<b>SCBA</b>	self-contained breathing apparatus
<b>SM</b>	Student Manual

<b>SOP</b>	standard operating procedure
<b>UC</b>	Unified Command
<b>USFA</b>	U.S. Fire Administration
<b>VA</b>	Veterans Affairs
<b>WUI</b>	Wildland Urban Interface

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