

# Firing Techniques







# Objectives & Fuels







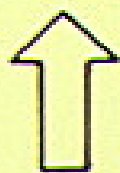
# Topography & Weather



# Firing Techniques

- ✱ Backing fire
- ✱ Strip-head fire
- ✱ Flanking fire
- ✱ Point source fires
- ✱ Center and circular (ring) firing
- ✱ Pile and windrow burning
- ✱ Aerial ignition
- ✱ Blacklines and high intensity head fires

NORTH

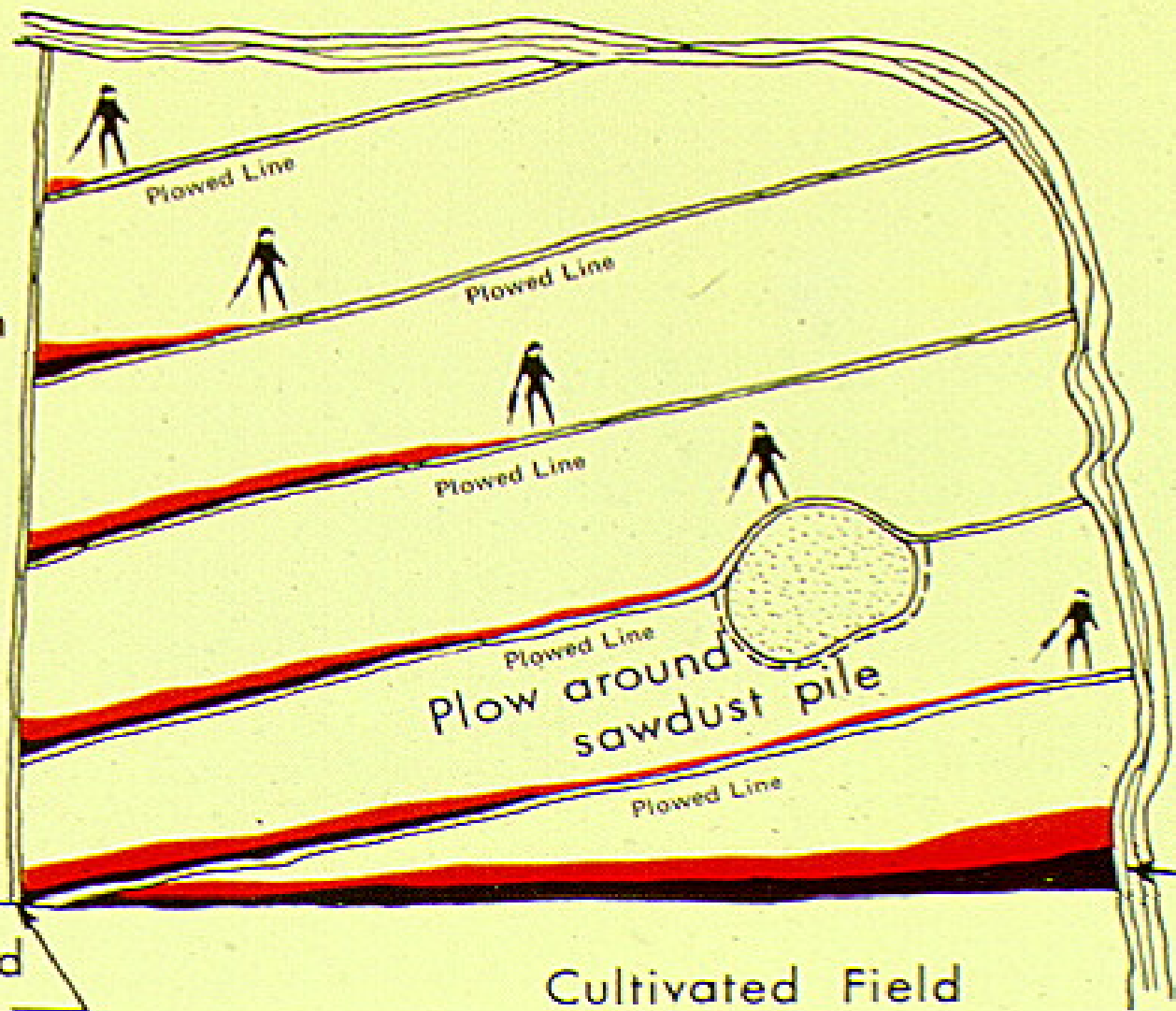


WIND



# Backfire Technique

Young  
Reproduction

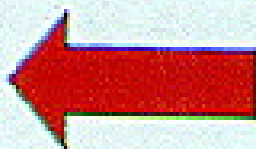


Start and end  
plowing here

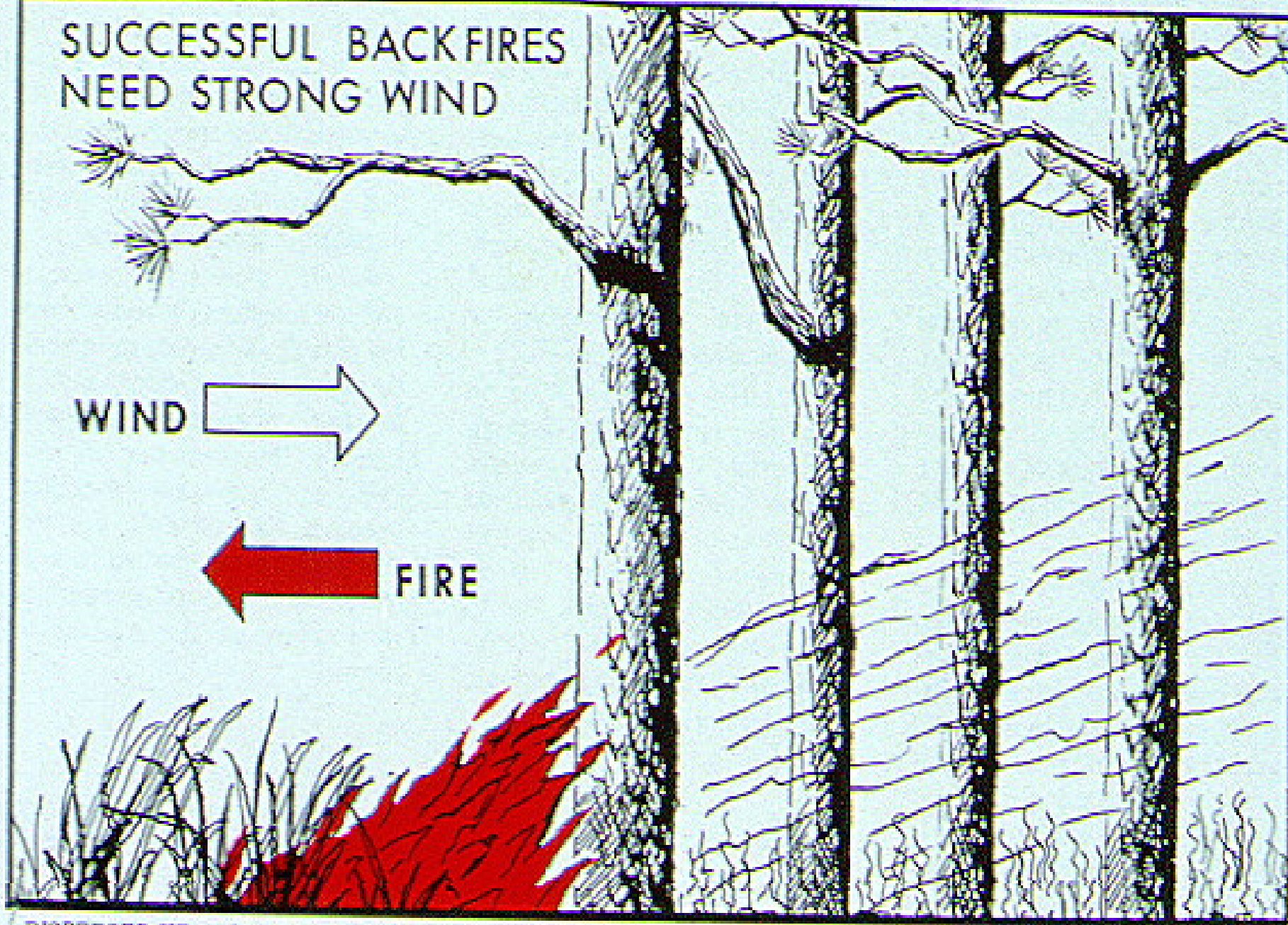
Cultivated Field

SUCCESSFUL BACKFIRES  
NEED STRONG WIND

WIND



FIRE



DISPERSED HEAT PREVENTS CROWN SCORCH





- Good fuel continuity
- Steady Winds
- Slow rate of spread





- Often used in young pine stands
- Results in little scorch
- Costs are high



WIND



— PLOW LINE

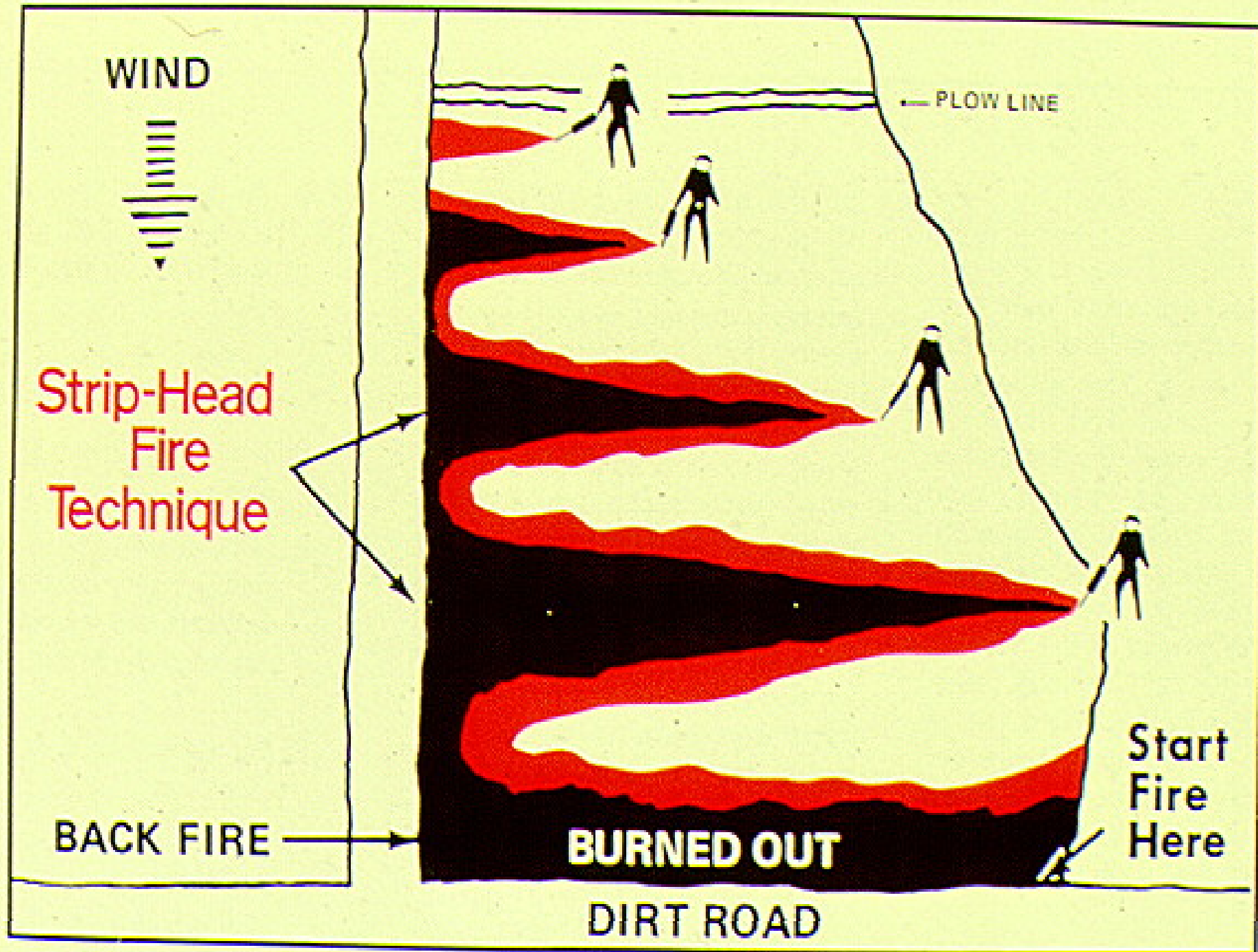
Strip-Head  
Fire  
Technique

BACK FIRE

**BURNED OUT**

Start  
Fire  
Here

DIRT ROAD

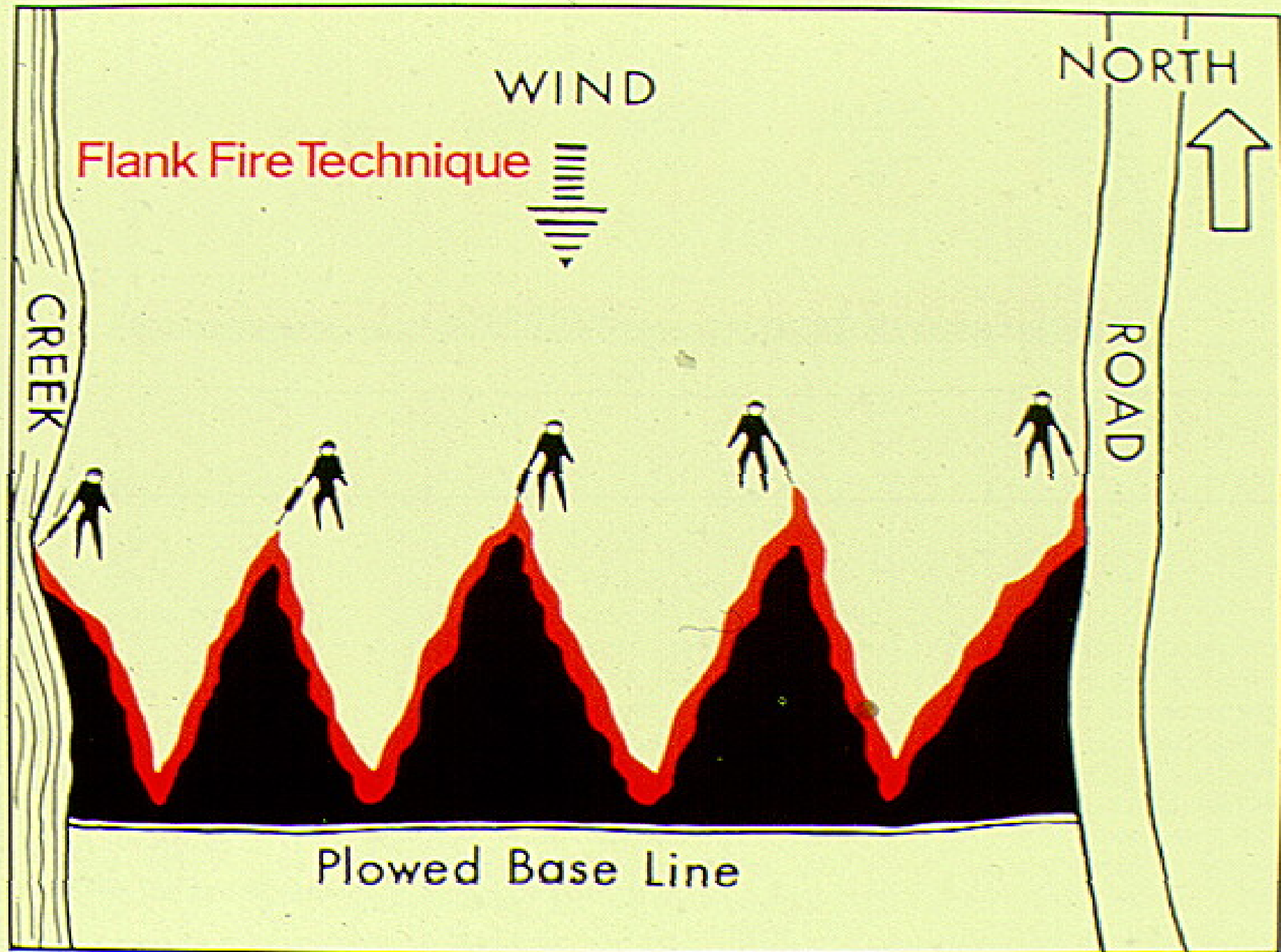


- Light and uneven distributed fuels
- Need little wind
- Good control of fire behavior
- Fast rate of spreads







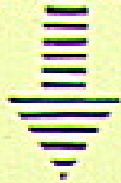




- Light-medium fuel loads
- Steady winds
- Allows for fast ignition



WIND



NORTH



Spot Fire Technique

Plowed Line

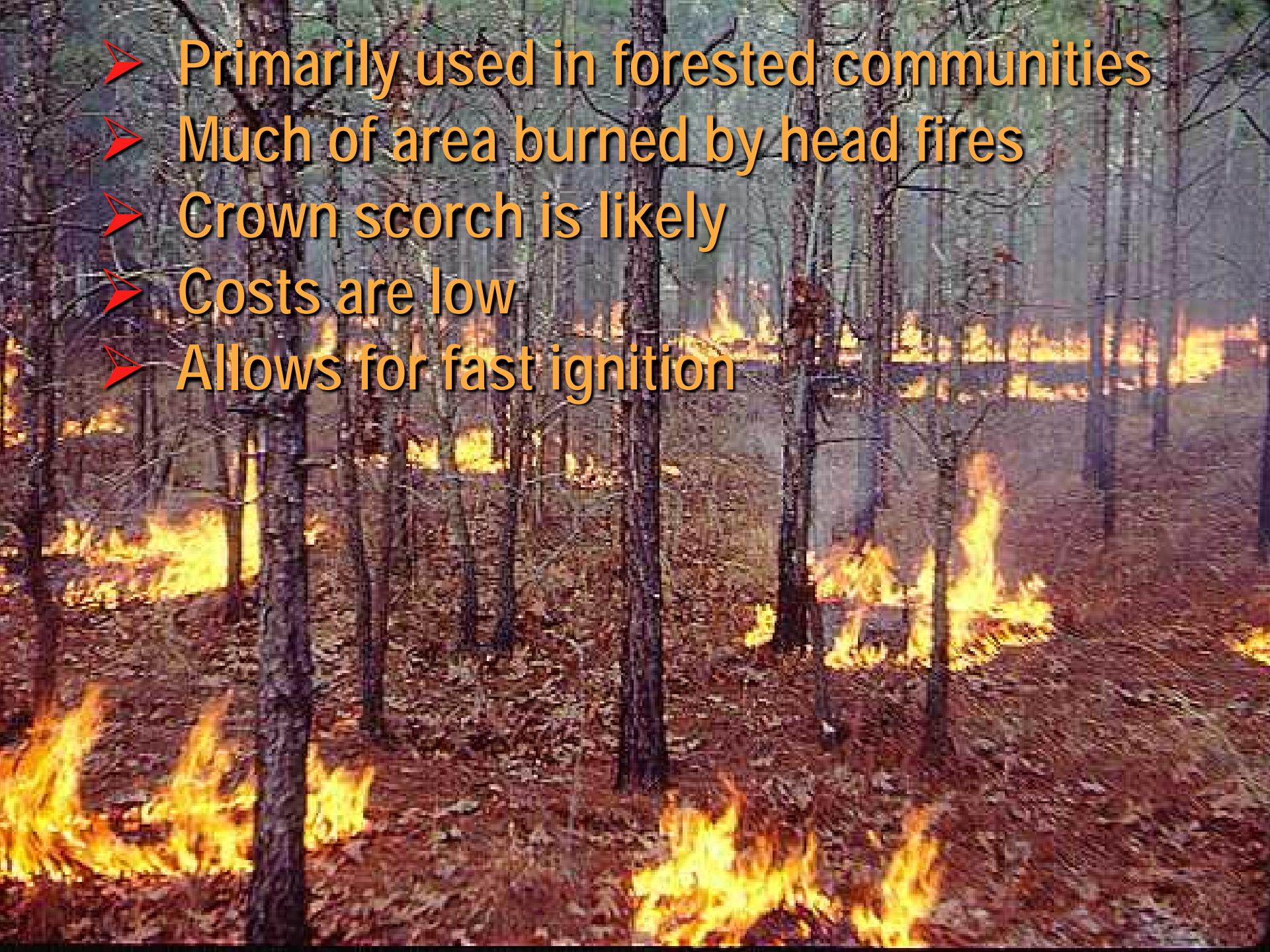
Plowed Line

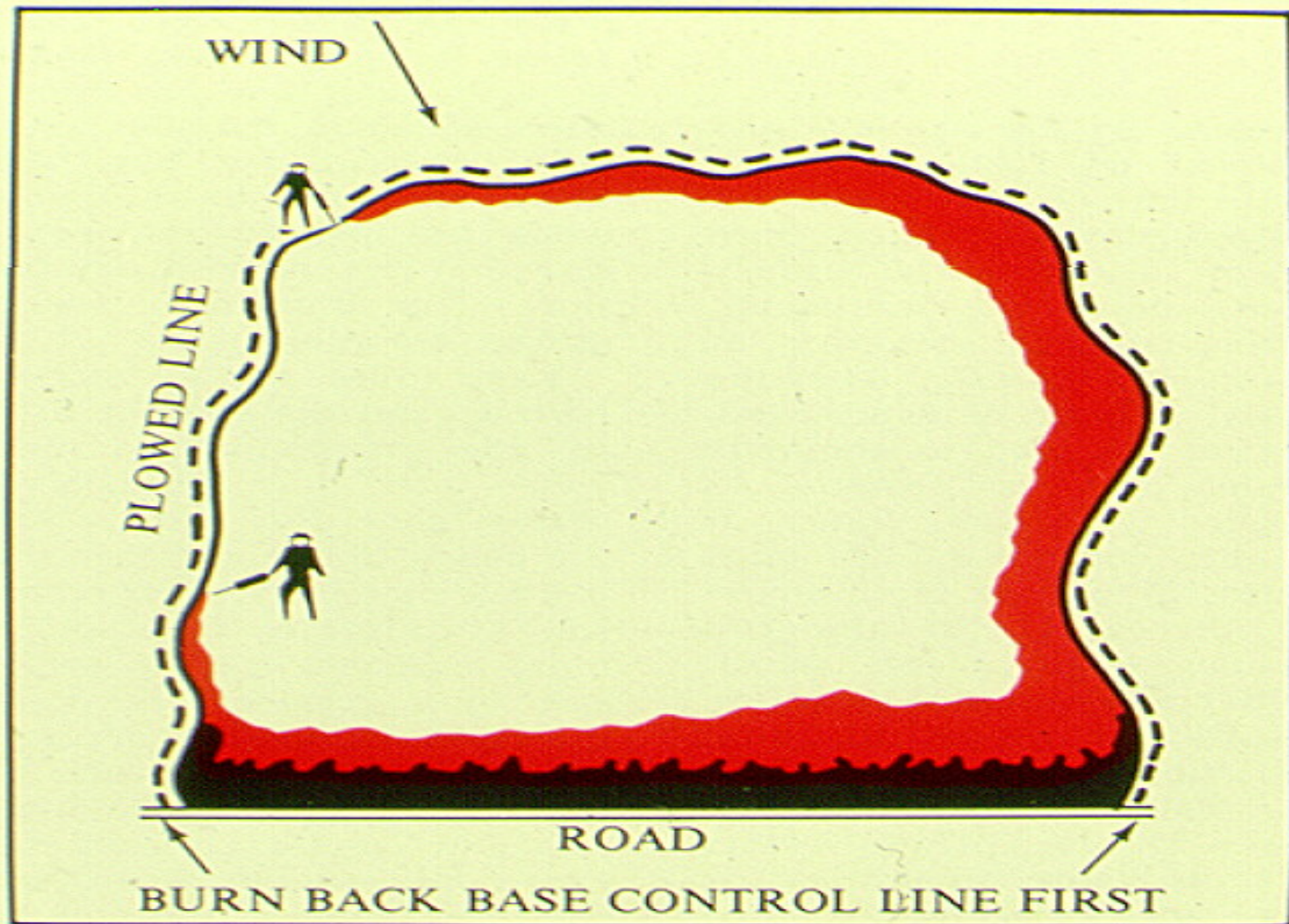
ROAD





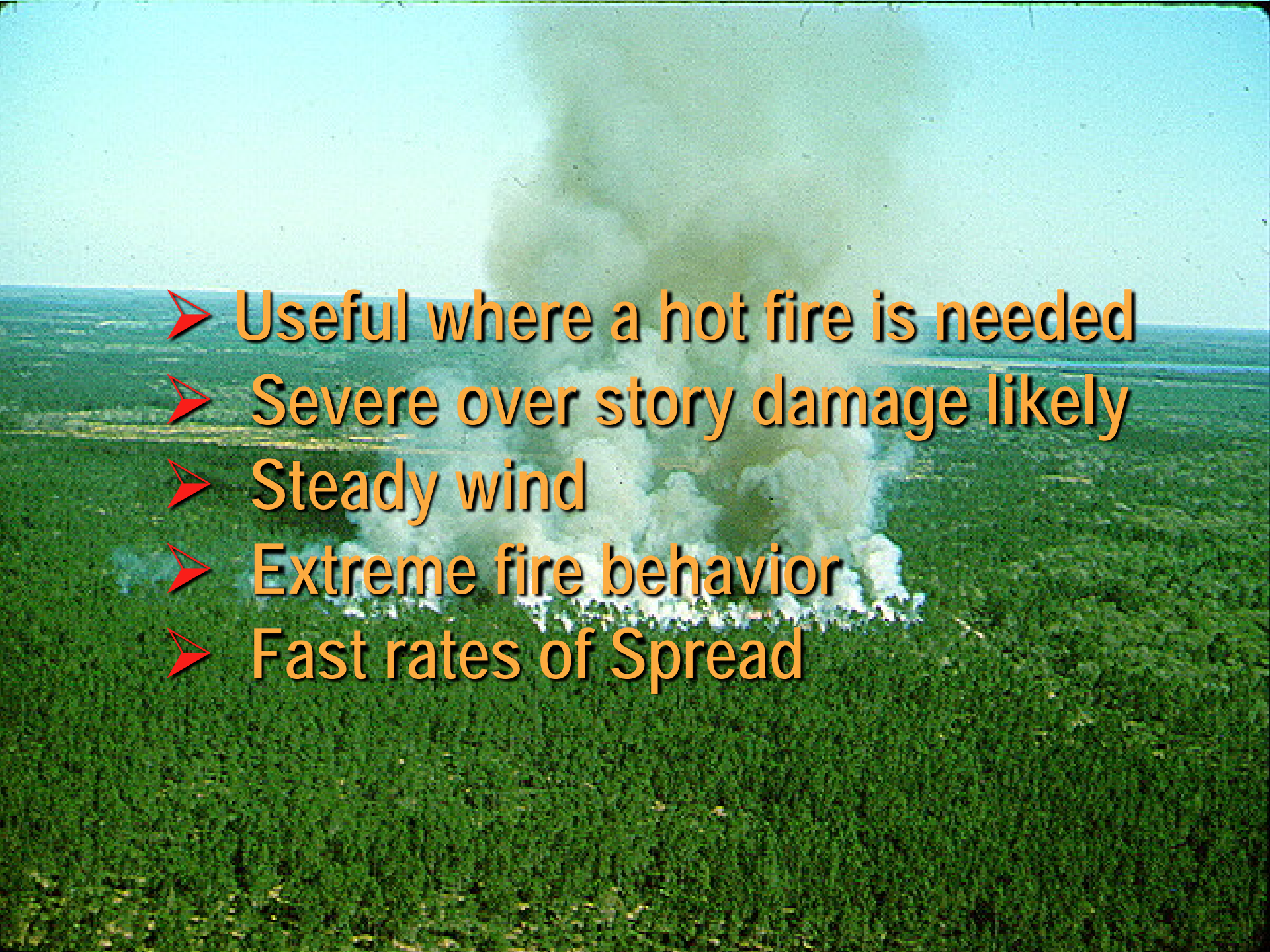
- Primarily used in forested communities
- Much of area burned by head fires
- Crown scorch is likely
- Costs are low
- Allows for fast ignition





Ring Fire Technique



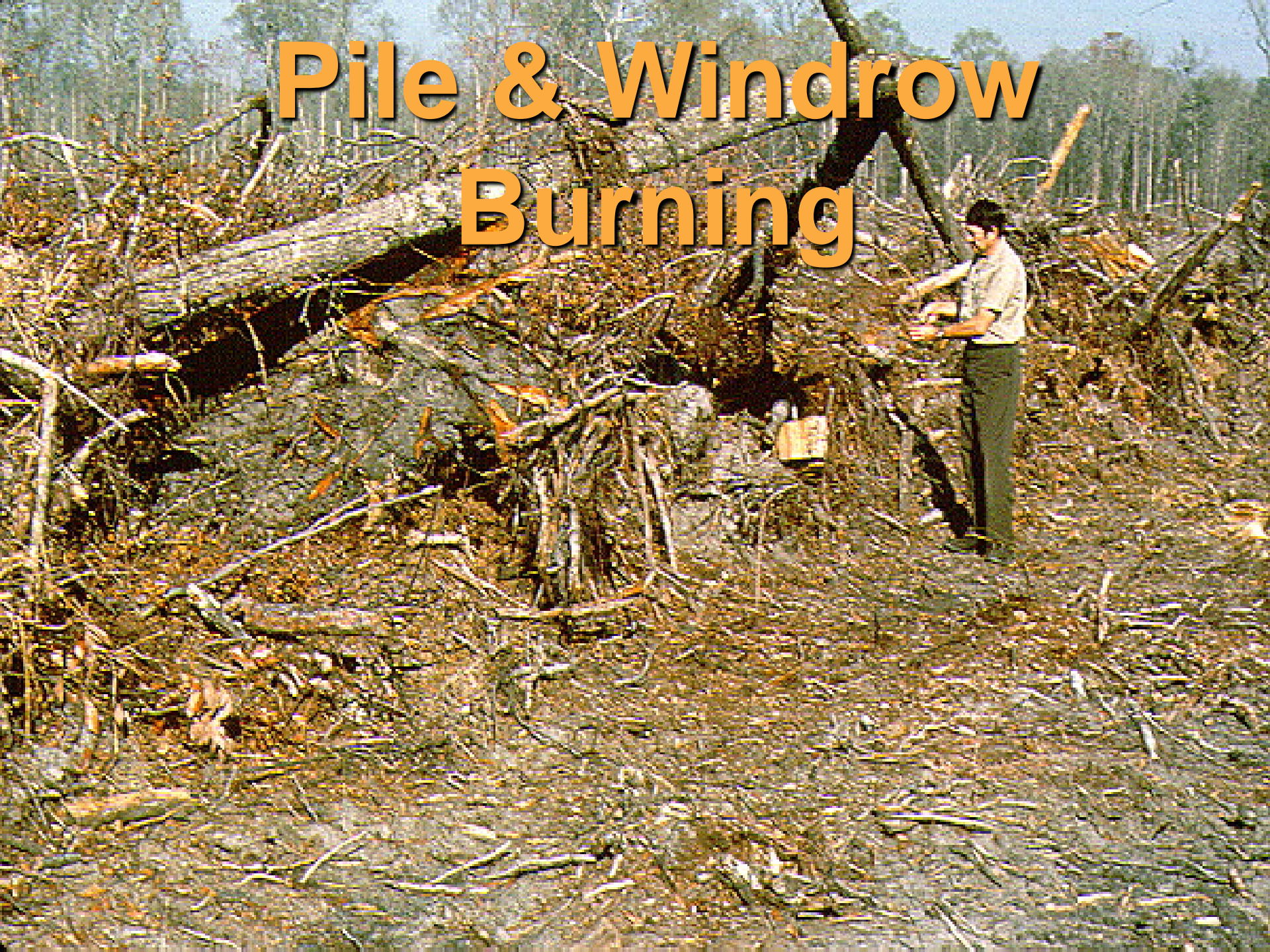
- 
- Useful where a hot fire is needed
  - Severe over story damage likely
  - Steady wind
  - Extreme fire behavior
  - Fast rates of Spread

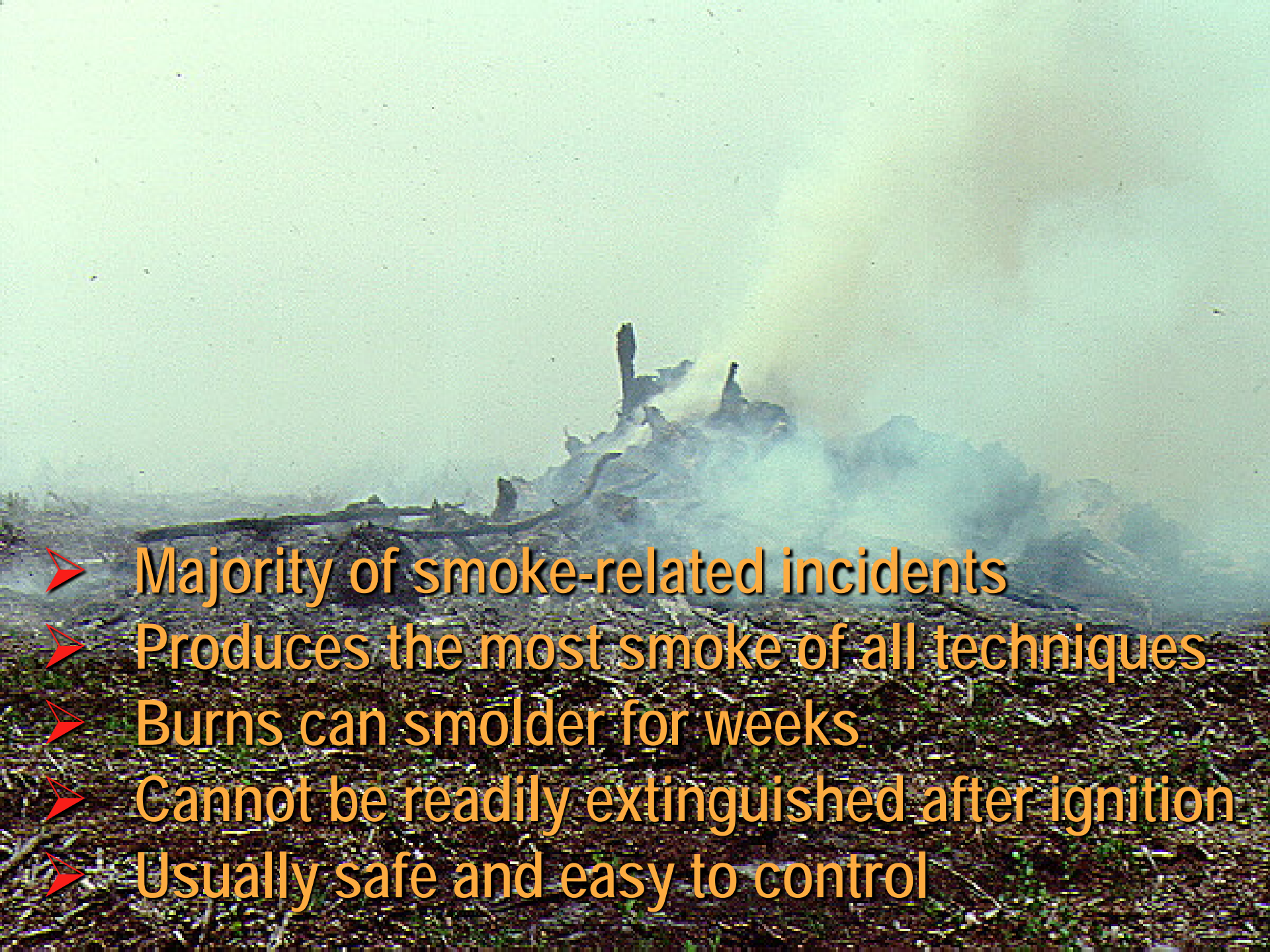
- Produce large volumes of smoke
- Little control of fire behavior





# Pile & Windrow Burning





- Majority of smoke-related incidents
- Produces the most smoke of all techniques
- Burns can smolder for weeks
- Cannot be readily extinguished after ignition
- Usually safe and easy to control





- Neutral to unstable conditions for good smoke dispersion
- Good mixing heights and transport winds

# Aerial Ignition





# Delayed Aerial Ignition Device (DAID)

A person in a dark jacket and pants is standing next to a white aircraft with a red stripe. They are operating a grey, boxy device mounted on the aircraft's side. The device has a red handle and a control panel with several buttons and a small display. The person is holding a long, thin rod or hose connected to the device. The background shows a paved area and some trees.

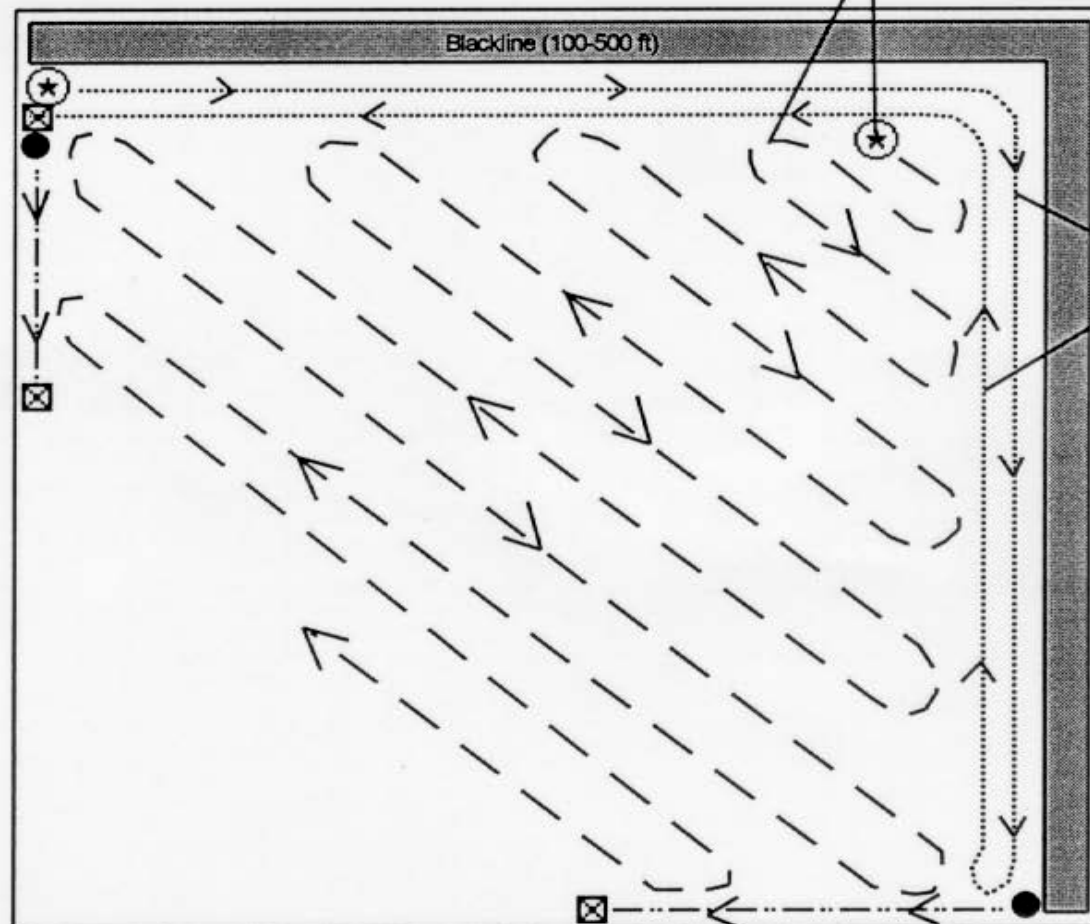
- Best suited for continuous fuels
- Ignition spacing can be easily adjusted



- Not as safe as the DAID, but less expensive
- Larger crew required
- Difficult to regulate spacing
- Most efficient for large, open areas with discontinuous fuels

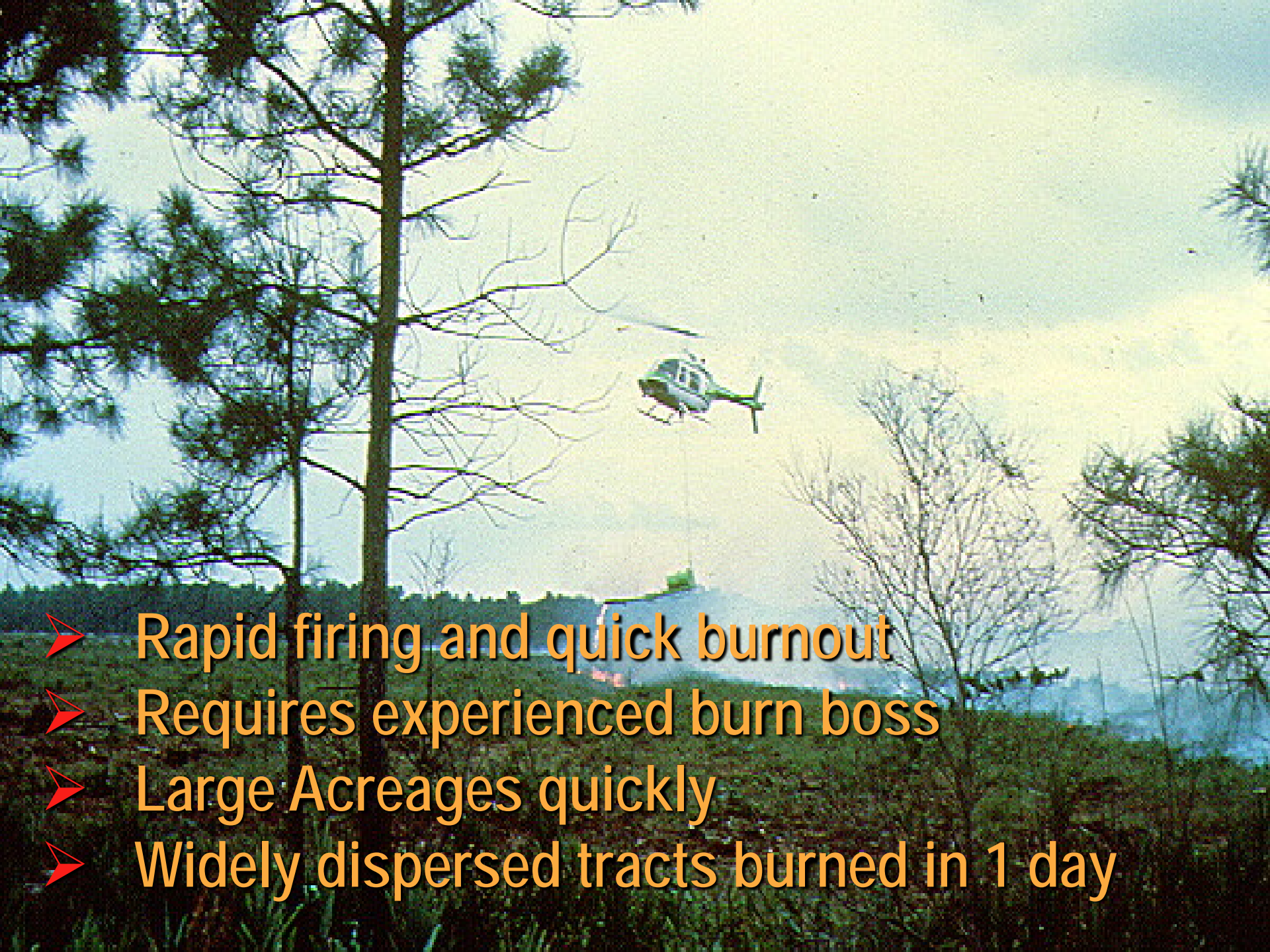


Once reaching the headfire prescription, helitorch ignition should proceed perpendicular to the wind direction



Prior to 11:00 am, widen blackline to 1000 ft with helitorch

wind

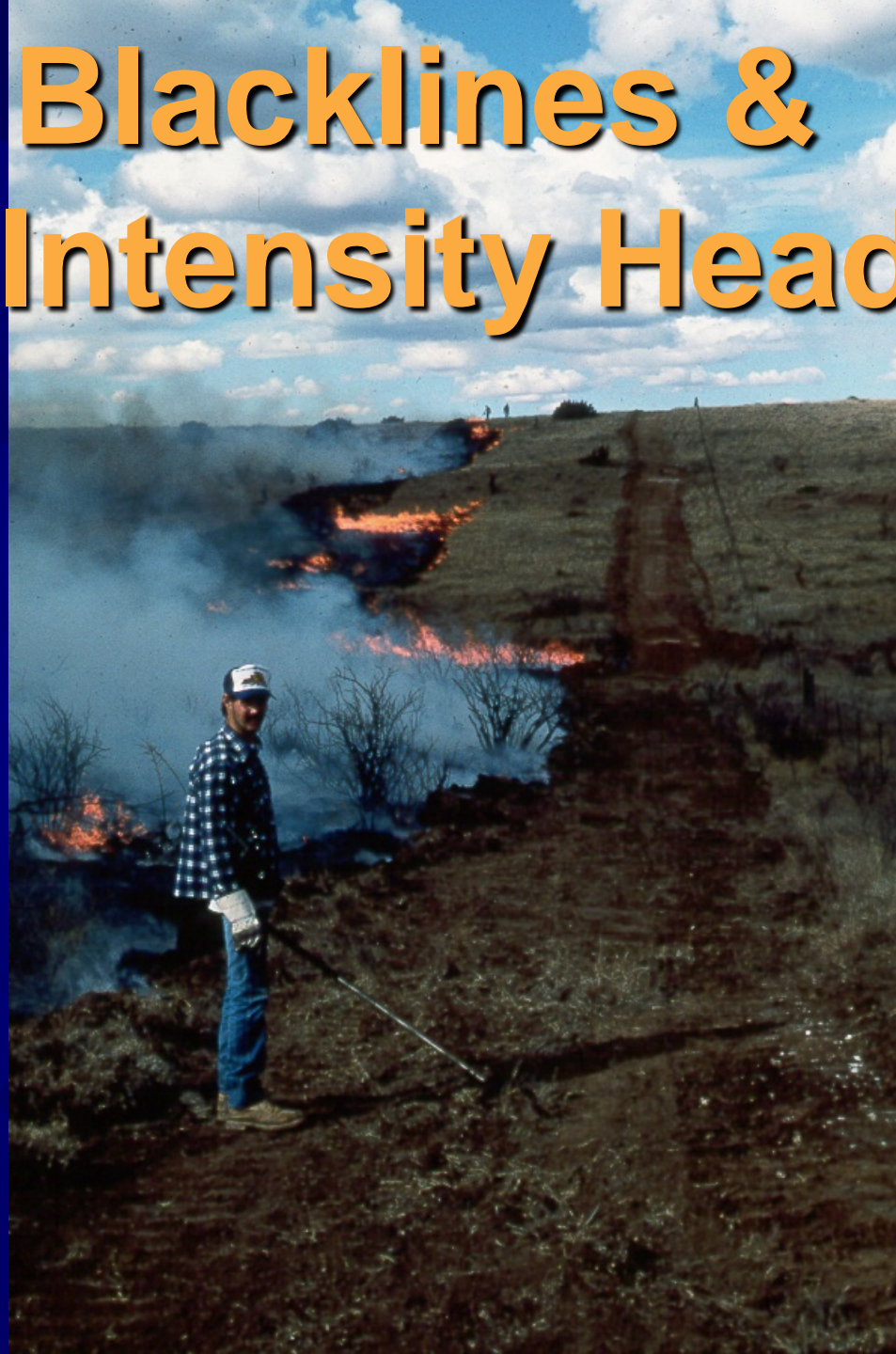


- Rapid firing and quick burnout
- Requires experienced burn boss
- Large Acreages quickly
- Widely dispersed tracts burned in 1 day





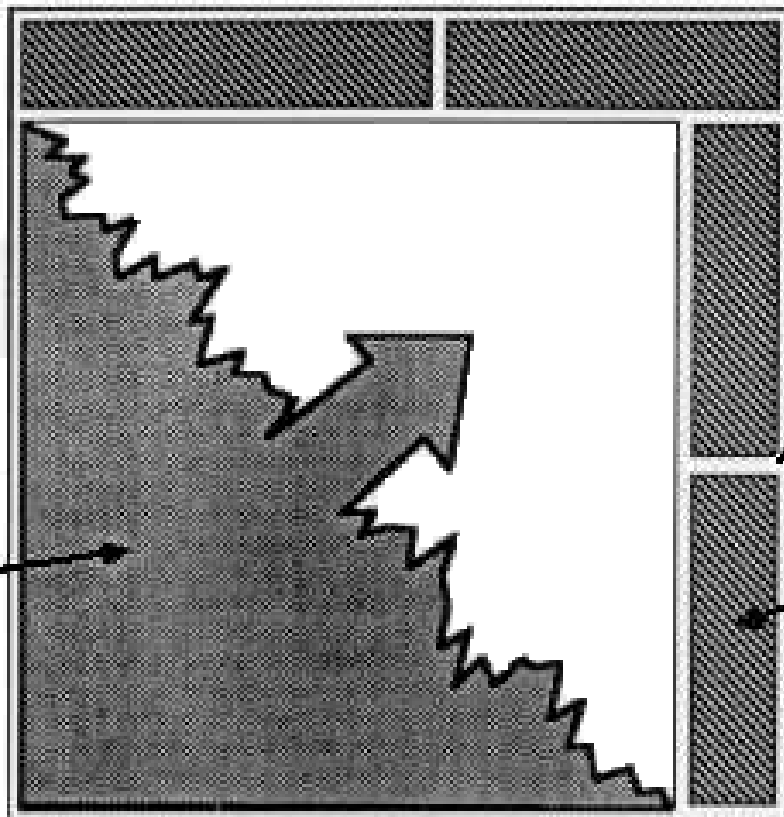
# Blacklines & High Intensity Headfires





# General Prescription

**FIRELINE**  
**100-500 FT** [



↑  
**N**

**DOZED LINE**

**RH 25-40%**  
**TEMP 70-80°F**  
**WIND 8-15 MPH**

**RH 40-60%**  
**TEMP 40-60°F**  
**WIND 0-10 MPH**

# **PRESCRIPTION**

## **For Blacklines in Summer**

**Scheduling : Approx. Date(s)**

June-September

**Time of Day**

9:00 am to 1hr pre-sunset or at night

### **Acceptable Prescription Range**

**Temperature (broad range)**

**80°F-100°F**

**Relative Humidity**

**30%-60%**

**Wind Direction**

**as needed**

**Wind Speed (MPH-eye level)**

**0-8 mph**

**Cloud Cover (> or < 50%)**

**<50%**

### **Environmental Conditions**

**Fine Dead Fuel Moisture**

**5-12%**

**Live Fuel Moisture**

**>80%**

**Herbaceous Fuel Moisture (%)**

**>60%**



# **PRESCRIPTION**

## **For Headfires in Summer**

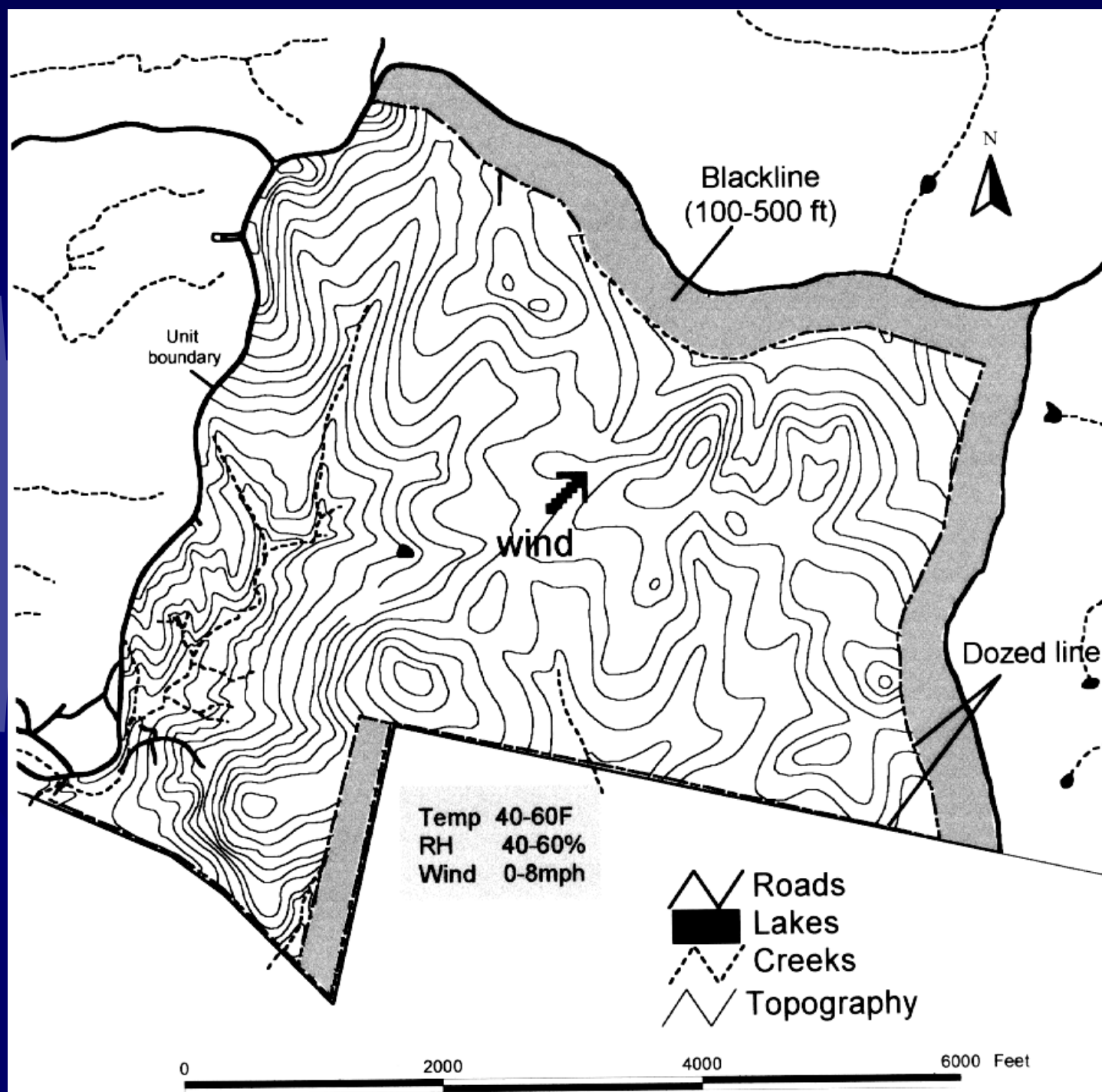
<b><u>Scheduling</u> : Approx. Date(s)</b>	June-September
<b>Time of Day</b>	9:00am-1hr pre-sunset

### **Acceptable Prescription Range**

<b>Temperature (broad range)</b>	<b>85°F-100°F</b>
<b>Relative Humidity</b>	<b>20%-40%</b>
<b>Wind Direction</b>	<b>as needed</b>
<b>Wind Speed (MPH-eye level)</b>	<b>5-15 mph</b>
<b>Cloud Cover (&gt; or &lt; 50%)</b>	<b>&lt;50%</b>

### **Environmental Conditions**

<b>Dead Fuel Moisture</b>	<b>3-10%</b>
<b>Live Fuel Moisture</b>	<b>65-90%</b>
<b>Herbaceous F.Moisture (%)</b>	<b>&lt;50%</b>



# Juniper Fuel Moisture Guidelines for >4 ft juniper:

**<60%** Drought and/or summer conditions with high fire intensity and possible extreme fire behavior.

**60-75%** Relatively dry conditions with high fire intensity, often used for headfires, adequate fine fuel (>1200 lbs/acre) still needed for successful headfire.



# Stripping of Leaves from Juniper



# **Juniper Leaves (No woody material)**





**The sample should be taken at about a 3 ft level from similarly sized juniper.**

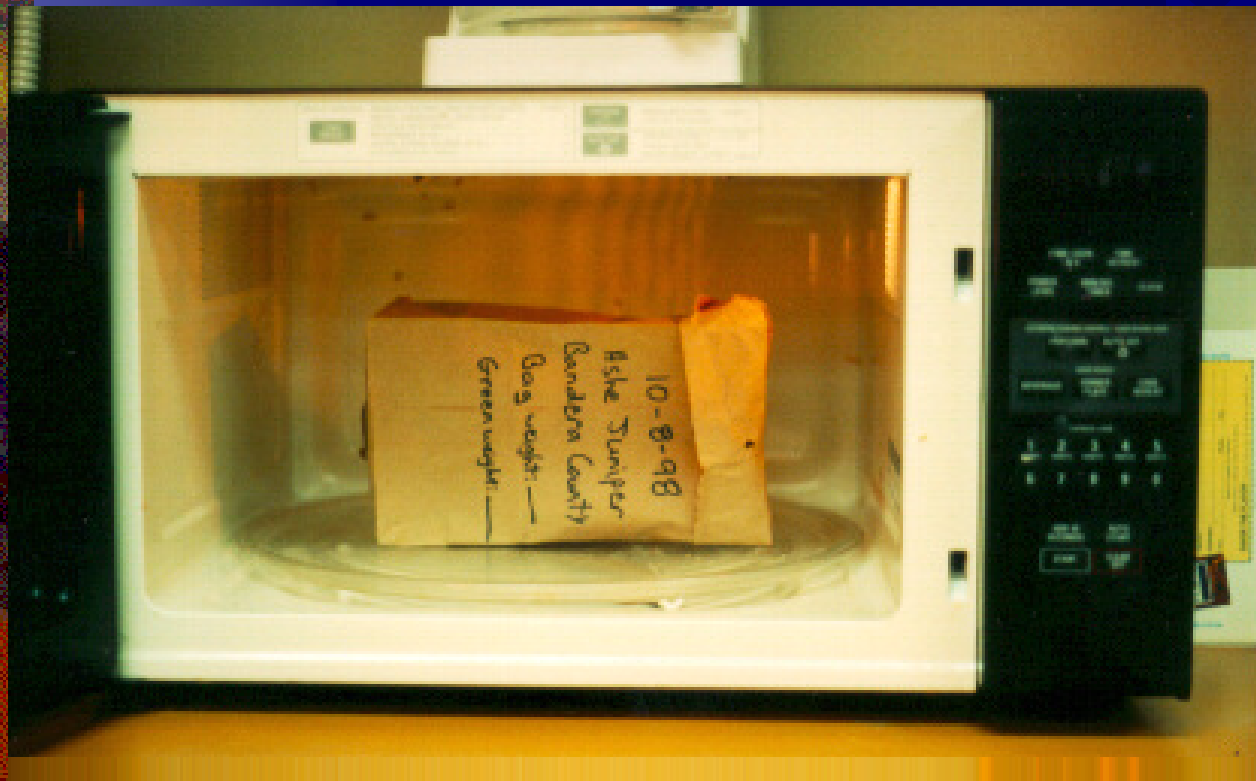
**The fuel moisture can vary greatly across the burn unit, so samples should be taken throughout the unit.**

**Weigh the sample in the field. A good sample will weigh around 100 grams.**



**The sample can be dried in a microwave at 30 second intervals. The sample should be allowed to cool before starting another heating interval. Total drying time will vary depending on the amount of moisture in the sample.**

**Do not dry the sample in an area where individuals may be sensitive to the odor of drying juniper.**




$$\frac{\text{Wet weight} - \text{Dry Weight}}{\text{Dry weight}} \times 100 = \% \text{LFM}$$

**Examples:**

$$\frac{100\text{g} - 50\text{g}}{50\text{g}} \times 100 =$$

$$\frac{105\text{g} - 62\text{g}}{62\text{g}} \times 100 = 69\% \text{ LFM}$$















# Juniper Fuel Moisture Guidelines

for >4 ft juniper:

**76-85%** Moderate conditions with moderate fire intensity in juniper, often used for burning blacklines, adequate fine fuel (>2000 lbs/acre) needed for successful headfire.

**>85%** Relatively moist conditions with moderate to low fire intensity in juniper, often will experience poor topkill of juniper. Adequate fine fuel (>3000 lbs/acre) may produce successful headfire.

