



Fire Protection Training

Procedures Handbook 4300

VEGETATION FIRES

TOPIC: Handline Construction

TIME FRAME: 2 Hours

LEVEL OF INSTRUCTION:

BEHAVIORAL OBJECTIVE:

Condition: A written quiz

Behavior: The students will list and describe the methods, safety considerations, advantages, and disadvantages of direct and indirect line construction utilizing wildland firefighting handtools.

Standard: With a minimum of 70% accuracy

MATERIALS NEEDED:

- Appropriate visual aids
- Audio visual equipment

REFERENCES:

- Principles of Forest Fire Management, Clar and Chatten
- USFS, Water vs. Fire Booklet
- USFS, CDF, Forest Fire Fighting Fundamentals Booklet
- Forest Fire: Control and Use, Kenneth P. Davis
- USFS, Fireman's Guide
- Wildfires, Prevention and Control, Harry P. Gaylor
- IFSTA, Ground Cover Firefighting Practices, 2nd Edition, Chapter 4

PREPARATION:

Control lines constructed by hand are one of the oldest methods of wildland fire suppression. This method is used in areas too steep for mechanized equipment, in areas where mechanized equipment would cause severe damage to the environment, or where use of mechanized equipment would be otherwise impractical.



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HANDLINE CONSTRUCTION

PRESENTATION	APPLICATION
<p>I. LINE CONSTRUCTION</p> <p>A. Line Construction Is the Act of Constructing a Continuous Line Around the Perimeter of a Wildland Fire, Whether It Be Done by Machines or Firefighters with Hand Tools</p> <ol style="list-style-type: none">1. The objective is to remove flammable material down to mineral soil in order to stop the combustion process2. Wildland fire fighting is essentially perimeter control <p>II. LINE LOCATION</p> <p>A. In Determining the Location to Begin Line Construction, the Safety of Personnel is the First Concern</p> <ol style="list-style-type: none">1. Escape routes and safety zones must be identified and communicated to all members2. Use safest route through green to fire perimeter or spot fire3. Use lookouts4. Avoid areas of potential rolling/slipping/falling material5. Avoid snags/widow makers where possible6. Use direct attack if at all possible	<p>Review fire tetrahedron</p> <p>Name two factors affecting the selection of line location.</p>



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<ul style="list-style-type: none">7. Watch for mechanized equipment above the control line8. All personnel in the crew shall maintain at least a 10 foot interval between themselves and other members of the crew to prevent injuries from tool use<ul style="list-style-type: none">a. Jargon is "keeping your dime"B. Factors to consider when determining line location should include:<ul style="list-style-type: none">1. Line construction should begin at a secure anchor point2. A termination point should also be established to measure progress3. Take advantage of sparsely covered areas4. Take advantage of barriers, roads, trails, and ridge tops<ul style="list-style-type: none">a. This will expedite line construction and control of the fireb. Assess practicality of burning out irregular control line<ul style="list-style-type: none">(1) Shortens line(2) Easier mop up5. Keep lines as straight as possible<ul style="list-style-type: none">a. Avoid sharp angles because fire will jump the line more readily at the angle6. When possible take advantage of terrain to avoid an undercut line	<p>Information sheet #1</p>

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<ul style="list-style-type: none">a. This will reduce the need for trenching to catch rolling embers, pine cones, tree limbs, logs, etc.7. Use direct method of attack if possible:<ul style="list-style-type: none">a. To reduce the final acreage of the fireb. Usually the safest way to attack the firec. Takes advantage of inactive line8. Where firing operations are planned locate lines to give uphill start for firing operation9. Block off high hazard type fuels where possible by leaving them outside of constructed lines<ul style="list-style-type: none">a. Snags standing or on groundb. Heavy fuel concentrationsc. Live oak trees10. Where fire is spreading rapidly or is very hot, locate line to give time for line construction and burning out (indirect method)11. If numerous spot fires occur within a small area select the most open area possible and place a line around the entire area instead of a line around each spot fire<ul style="list-style-type: none">a. Less line to cut therefore quickerb. Mark a trail from the main fire to the spot firec. Cut your way into spot fire, do not crash through brush and get trapped	



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III. LINE CONSTRUCTION TECHNIQUES

A. Hookline order

1. Cutting tools to the front, cutting the fuels
2. Scraping tools to the rear, scraping and completing the line down to bare mineral soil

B. One lick technique

1. Each crew member is responsible for clearing a small portion of the line width and then moving forward

- a. Each succeeding crew member widens existing line

C. Bump up Technique

1. Some tools and positions in the hookline order are more tiring than others. To prevent crew fatigue it is a good practice to have each crew member "bump up" periodically to a different tool/position.

D. Leap Frog Technique

1. "Leap Frog Method" Each crew member or crew is responsible for clearing a small section of the line to its full width and then passing other crews or crew members to clear another unworked section of line.

Contrast the "one lick" "bump up" and "leap frog" line construction techniques

IV. LINE CONSTRUCTION METHODS

- #### A. Hot Spotting Is Defined as Checking the Spread of a Fire at Points of More Rapid Spread or Special

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Threat. It Is Usually the Initial Step Where Prompt Control Is the Top Priority.

1. Hot spotting is a practice often used by fire crews as well as by engine crews and heli-tack crews
 - a. Control or check the rapidly spreading points of the fire and to knock down localized flare-ups
2. Less active sections of the fire, are left to the trailing crew. The object is to hold the fire in place until a continuous control line can be constructed.
3. When hot spotting:
 - a. Increase the width of line
 - b. Go to extremes in scattering cut material to prevent slopovers
 - c. A hot spotting crew can contain several hot spots by leaving one or more firefighters at each spot after knockdown is reasonably assured.
4. Hot spotting is accomplished by using:
 - a. Handtools to throw dirt at the base of the flame to cool and smother it and to construct handline
 - b. Water to lower the fuel temperature below its ignition temperature

What is hot spotting?

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<ul style="list-style-type: none">5. During initial attack, hot spotting is done to check the spread of small heads or fingers and to prevent the fire from getting into:<ul style="list-style-type: none">a. Fuels in which the fire will burn fasterb. Heavy masses of fuel such as logs or snagsc. Fuels where line construction will be more difficultd. Fuels on steeper slopese. Exposures6. Hot spotting requires tremendous physical effort from firefighters and basic knowledge of fire behavior due to exposure to:<ul style="list-style-type: none">a. Ambient air temperatureb. Heat from the firec. Physical exertiond. Potentially extreme fire behavior7. Hot spotting may also be accomplished by fire engines, air tankers, and/or dozers, attacking one hot spot after another instead of establishing a continuous line along the fires edge. Purpose is to contain the fastest burning parts of the fire first and then to complete the line later for full control.8. Hot spotting is also appropriate when equipment and personnel are in short supply.<ul style="list-style-type: none">a. Fire spread is limited resulting in fewer acres burned and less line to be constructed	



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<p>9. While attention is focused on hot spotting rapidly spreading portions of a fire, it has to be kept in mind that a change in wind direction or topography can change a flank into a dangerous head.</p> <p>B. Scratch Line</p> <ol style="list-style-type: none">1. May be extremely narrow2. Need not be continuous3. Usually constructed just wide enough to temporarily hold the fire in check, until a finished line is constructed <p>C. Finished Line - is constructed directly on the fire's edge and is approximately 1-1/2 times wider than the height of the adjacent cover fuels.</p> <ol style="list-style-type: none">1. All flammable vegetation and ground fuels are removed and the control line is cleaned down to bare mineral soil2. Roots are to be cut at both ends and removed from the control line3. The finished line, should not be less than 18" wide regardless of fuel height4. All burned/charred material should be thrown well back into the burn. No windrows.5. All green fuels should be scattered on the unburned side of the line. Do not windrow them.6. Islands of unburned or singed materials are cut and scattered or are cold trailed, if burning out is not safe or practical.	<p>Information sheet #3</p>



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<ul style="list-style-type: none">7. Unburned fuel left between the fire and the control line should be burned or cut and scattered.8. All overhanging branches above the control line must be cleared9. Spot fires are treated the same as the main fire<ul style="list-style-type: none">a. Trails to spot fire should be flagged and called to the attention of relief crews10. Snags should be removed from the fire edge, if unable to remove, construct a ring around each.	<p>How would you mark a trail into a spot fire?</p>
<p>D. Trenching</p> <ul style="list-style-type: none">1. When it is necessary to construct an undercut line; that is, a control line along a slope below the burned area, dig a continuous trench to stop rolling burning material such as pine cones, mossy rocks, plant roots, small logs, stumps, and similar fuels from crossing the line.2. The lower side of the constructed trench, called the berm, should be made up of bare mineral soil or rocks.3. The depth and width of the trench is determined by the size and quantity of the potentially rolling fuels, and the steepness of the slope.<ul style="list-style-type: none">a. As a minimum the trench should be at least one foot deep and one foot wide.	<p>Information sheet #4</p>



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<ul style="list-style-type: none">b. Wider and deeper trenches must be constructed when the slope is very steep, the rolling material is large or where heavy accumulations of rolling material must be held.c. A trench must be of sufficient depth to prevent it from filling, when firefighting personnel walk above it, or in it.<ul style="list-style-type: none">(1) Do not walk on the berm as it smashes it down. Walk in the trench or below the undercut line.d. Effective hand tools for trenching are the pulaski, which can be used to loosen the soil using the grubbing edge, the McLeod, and shovels which are used to clean the trench out, shape it, and build the berm.<ul style="list-style-type: none">(1) The inside wall of the trench should be tapered to permit rolling material into the trench.(2) The outside wall should be sheer to minimize the chances of jumping out of trench and over the berm.e. Be alert for rolling burning material which may cross control line and start a fire below you.	<p>Information sheet #</p>

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SUMMARY:

Constructing handlines to control the spread of wildland fires is often the only technique available. The work is tiring and demanding under the best of circumstances. Failing to properly locate a line and take advantage of labor saving techniques can have devastating results.

EVALUATION:

A written quiz.

ASSIGNMENT:

To be determined by instructor(s).