

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATIONS  
FIREBREAK**

**1. Scope**

This practice applies on all land uses where protection from wildfire is needed or prescribed burning is applied.

**2. DESIGN**

In planning firebreak location, make maximum use of natural barriers such as roads, trails, streams, and rock escarpments.

Firebreaks should be installed shortly before the fire hazard season. Normally this occurs in the late fall after hard frosts.

Dimensions and types of firebreaks will be designed for each burn and recorded in the prescribed burn plan on Form KS-ECS-338.

Application and management of vegetation will be recorded on Form KS-ECS-4, Grass Seeding, and/or Form KS-ECS-23, Vegetative Management.

The effective width of firebreaks should be approximately 10 times the height of the vegetation being burned.

When burning volatile fuels with potential for down-range spotting, a 300 to 500 feet minimum width shall be used for firebreaks.

Firebreaks should be installed with gradual corners when installed around areas to be left unburned.

With a SE wind, the crew would be working from west to east lighting the headfire.



**Design 1—Unsafe**  
Areas in red are where crew would be working in the same direction as the headfire.

**Design 2—Safe**  
The gradual angle across the direction of the wind will allow the crew to have the headfire going away from them.

 SE Wind

### 3. Firebreak Types

#### Backfiring

- Denude strips or corridors by backfiring to provide a barrier along fire hazard areas.
- Effective control normally is provided by strips 30 to 80 feet in width, depending on the height and volume of vegetation.
- Proper equipment should be on hand before beginning this operation. Mobile fire fighting units are essential to keep the backfire in check and prevent inadvertent burning.
- Generally, create burned firebreaks or blacklines under the following criteria:
  - Wind velocity: 4 to 10 mph
  - Relative Humidity: >50 percent
  - Air Temperature: <70 degrees Fahrenheit

#### Bare ground or mineral soil

- Remove flammable materials from strips along the edge of the danger area by tillage using a plow, disk, bulldozer, road grader, or with soil sterilants.
- Strips should be 12 feet or more in width and located to reduce erosion hazards to a minimum by going around sand dunes and circling steep areas on the contour.
- This method may be used in combination with backfiring.
- Erosion and landscape scar problems can be minimized on bare soil by moving and spreading the former vegetation and debris back onto the firebreak after the completion of the burn. A cover crop should be considered in situations where existing vegetation is sparse and continued cover is needed.

#### Grazed Border Strips

- Install border strips of cool-season grasses adjacent to area to be protected.
- Strips should be at least 20 feet in width.
- Prepare seedbed and seed cool-season grasses according to Conservation Practice 512, Pasture and Hay Planting.
- Fertilize each fall or spring to encourage close grazing for effective use as firebreak. If not grazed, mulch accumulation in these areas can be enough to burn even when significant green leaf material is present and can be difficult to extinguish.
- See Kansas electronic Field Office Technical Guide (eFOTG), Section II, Pasture and Hay Suitability Groups, for adapted cool-season grasses. Kansas Plant Materials Technical Note KS-1 is the reference for cool-season grass variety adaptation.
- Native grass borders can be fertilized with nitrogen in the spring or fall to encourage cool-season growth and improve utilization of the border areas during full-season grazing. Fertilizing native grasses and heavy use of the areas on an annual basis will cause a shift from warm-season grass domination to cool-season grass domination. If cool-season grasses are desired, fertilizing in the fall and early spring will favor the cool-season component. If wanting to favor native grass utilization and growth, fertilize with no more than 30 units of nitrogen in early to mid-May.
- Be aware that introducing a non-native species of vegetation into a native grass area will increase the potential for the spread of the non-native species if not managed properly.

### **Mowing and Haying**

- Mowing should be completed in early fall after a killing frost for prescribed burns to be completed in the spring of the following year. This allows time for residues to break down over the winter. The mowed area will generally be the first to green up in spring, creating a vegetative barrier.
- Mowing or haying immediately prior to a prescribed burn is not desirable because of the potential confinement problems resulting from dry residues. If this method is chosen, aggressive raking may be needed in order to remove the residues outside the firebreak.
- Mowed or hayed firebreaks should be wide. Cut vegetation should be removed (if program requirements allow) prior to burning.

### **Chemical Retardants**

- Chemical retardants are usually applied on the fireline just prior to fire initiation.
- Chemical retardants work best when sprayed on short fuel such as a mowed firebreak (recommend no greater than 3-inch litter height). All litter in the area being sprayed must be coated in order to prevent burning.
- A drawback is the need for a second crew on each fire and for special application equipment.
- Cost of materials can be expensive along with special clothing and training for those who mix and apply the chemicals
- Ammonium polyphosphate is the main retardant used. PhosChek is a commercial formula that is available. Follow product label recommendations when mixing and spraying. A 10-34-0 liquid fertilizer available at local fertilizer dealers can also be used. Mix the liquid fertilizer as a 10 percent solution in water (1 gallon fertilizer to 9 gallons water). Follow the manufacturer's label recommendations.

### **Foam Retardants**

- Foam retardants can be applied on a fireline just prior to fire initiation.
- Advantages of using foam include: (1) foam expands the amount of water available and extends a given water supply 3 to 10 times, (2) it incorporates the characteristics of a setting agent, (3) it has smothering and insulation effects, and (4) foam is more persistent and visible than water.
- Foam mixed with water at a rate of 0.2 to 1.0 percent can be sprayed through a regular water nozzle. It can also be sprayed through an aspirating nozzle that adds air to the foam solution to create thicker foam. Compressed Air Foam Systems (CAFS) are also available for use to minimize water that is needed, but require air compressors or air cylinders and special regulators and valves.
- Disadvantages to using foam in a tank include potential corrosion of the tank, pump, and sprayer parts. Foam solution can cause pump priming problems and tank overflow when the solution is agitated through the pump and from movement occurring during tank movement.
- Follow the manufacturer's label recommendations.

### **Wetline**

- Confining fires with wetline techniques is similar to applying chemical and foam retardants, except that the water can be applied with simpler equipment and a larger tanker will be necessary to carry large volumes of water.
- Unlike retardant chemicals, water or wetlines can evaporate rapidly. Be sure to light directly adjacent to the wetline and directly after the water is sprayed so the line does not dry before ignition.
- Water is cheap and simple equipment can be utilized.
- Wetting agents can be added to water to enhance its cohesiveness to fuels. Liquid dish washing detergent can be used at a rate of 1 fluid ounce of detergent per 100 gallons of water.

### **Flappers, Backpacks, Shovels, and Rakes**

- This method is not recommended for trying to complete large burns. This kind of equipment is required at most fires and requires added labor and time to be effectively used.

### **Snowbanks**

- This is a seasonal firebreak that is most useful when burning high-risk or difficult areas. For example, odd areas, rubbish, barnyards, and old buildings are generally safe to burn when sufficient snow cover is present.

In completing a prescribed burn, several of these firebreak techniques may need to be used in combination to complete a safe burn. Firebreak combinations will be documented in the prescribed burn plan on Form KS-ECS-338.

### **4. References**

<http://www.npwrc.usgs.gov/resource/habitat/burning/index.htm> (Prescribed Burning Guidelines in the Northern Great Plains)

<http://www.ksre.ksu.edu/library/crpsl2/L664.pdf> (Prescribed Burning, Planning, and Conducting)

<http://www.ksre.ksu.edu/library/crpsl2/l565.pdf> (Prescribed Burning, Safety)

<http://www.ksre.ksu.edu/library/crpsl2/l815.pdf> (Prescribed Burning as a Management Practice)