NATURAL RESOURCES CONSERVATION SERVICE

CONSTRUCTION SPECIFICATIONS

PRESCRIBED BURNING

1. Criteria

This practice will be applied in accordance with all state and local laws and ordinances. Refer to Section I, in the electronic Field Office Technical Guide (eFOTG). Contact the local fire department to determine current county burn policy.

All Natural Resources Conservation Service (NRCS) employees must have the proper certification and training to plan and to participate in prescribed burning activities. (Refer to General Manual Title 190, Ecological Sciences, Part 402.)

A 24-hour weather outlook is required prior to doing a prescribed burn.

The burned area must be incorporated into a system of management allowing for the response of the desired plant community. Refer to Conservation Practice Standards and Construction Specifications 528, Prescribed Grazing, and 511, Forage Harvest Management.

When wildlife habitat improvement is an objective, refer to the Habitat Appraisal Guides or Conservation Practice Standard and Construction Specifications 645, Wildlife Upland Habitat Management, for the desired plant community for the management species.

Plan precautionary measures to protect sensitive wildlife habitat, headquarters, oil and gas sites, windbreaks, highly erodible areas, archeological/cultural, or other areas that would be unsafe or undesirable to burn.

Prescribed burn plans shall be developed using the Form KS-ECS-338, Prescribed Burn. Burn plans shall include the necessary personnel, equipment, and firebreaks to conduct a safe burn.

Smoke management considerations should be addressed in the burn plan and included on the map or sketch.

Dimensions and types of firebreaks will be designed for each burn and recorded in the Prescribed Burn Plan. The effective width should be approximately 10 times the height of the vegetation being burned. The width of the firebreaks includes the constructed firebreaks and the burned firebreak. (Refer to Conservation Practice 394, Firebreak.)

Generally, create burned firebreaks or blacklines under the following criteria:

Wind velocity: 4 to 6 mph
Relative Humidity: 40 to 60 percent
Air Temperature: < 60°

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

Follow the manufacturer's label when using fire retardant.

Burning is not recommended when: (1) air temperature exceeds 80 degrees F (except for reclamation burns), (2) wind velocities exceed 20 mph, (3) relative humidity is less than 20 percent, or (4) variable or no-wind conditions.

The fireboss will be the sole leader and coordinator of all prescribed burning activities.

Burning is not recommended within 12 hours of a predicted wind shift.

For specific purposes and conditions for burning, see Table 1.

2. Considerations

Timing of the burn is the most critical element for obtaining the desire results from the burn. The kinds and amounts of various plants in a rangeland area can be changed by fire. Forage yield is affected by burning dates. The earlier the burning date, the lower the forage yield.

If down-range spot fires from volatile fuels are a concern, conduct the burn with air temperature below 50 degrees and relative humidity above 35 percent (See Figures 1 and 2).

When a portion of a pasture is burned, grazing management should be based on the burned area within the context of the long-range management plan. Burning will alter grazing patterns and can mediate erosion on heavy use areas.

Some unwanted plants may be increased following burning such as sericea lespedeza. Remedial action should be recommended to prevent an increase in unwanted plants.

The rooting depth should have enough moisture to support recovery of the desired plant species following the burn.

Firewhirls can be caused by burning under "nowind" conditions, burning headfires into backfires, and in canyons or hilly terrain.

Summer, fall, or winter burning may result in wind erosion on sandy soils (erosion on other soils is dependent upon the topography) even though burning may have occurred historically. Usually sufficient plant material remains to prevent excessive erosion.

Burning in the fall or during dry conditions can result in crown damage to bunchgrasses, which may be an objective for certain wildlife habitat management practices. The decision to use fall burning vs. spring burning depends upon the forage management objectives of the client, risk, and the species of concern.

In light fuel loads, continuity is more important for a continuous fire front than fuel loading.

Mop up is the process of checking the entire perimeter of the burn area to ensure that all fires or smoldering materials are out or removed from the edge of the perimeter to a safe area inside the burned area. Maintain close observation of the burned area until the fire is extinguished. Cow chips, logs and dead trees, stumps, small areas still burning, and fenceposts may smolder for several days after the burn if left untreated.

Fire is only one tool in an overall management plan. The decision to burn should be compatible with the long-term objectives of the resource and the client. In many cases, a long-term regime of prescribed burning will be needed to achieve objectives, not one single burn.

3. Plans and Specifications

Specifications (a Prescribed Burn Plan) shall be prepared for each burn in which NRCS is an easement holder or if a request is specifically made by a producer or client. The client and the certified NRCS employee designing and approving the burn shall sign the burn plan.

4. Operation and Maintenance

All NRCS employees who participate in prescribed burning must have the proper certification and training.

All burn crewmembers will wear flame resistant clothing or cotton or wool, leather gloves, and leather boots. Polyester clothing will not be worn on a prescribed burn. Protective eyewear, hat, and aspirator or breathing apparatus is desirable.

Prescribed burning can be physically strenuous. All crewmembers should be in good physical condition to enable them to perform all necessary tasks.

Operation and maintenance requirements are not applicable for this practice.

5. References and Other Reading Material

Ohlenbusch, P. D., Kunkel, J. W., 1991. Prescribed Burning - Safety. L-565 Revised, KS Coop. Ext. Serv., KSU, Manhattan, Kansas.

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Bidwell, T. G., Engle, D. M., Claypool, P. L., 1990. Effects of spring headfires and backfires on tallgrass prairie. J. Range Manage. 43(3)209-212.

Bidwell, T. G., and R. E. Masters, 1993. Using Prescribed Fire in Oklahoma. Circular E-927, OK Coop. Ext. Serv., OSU, Stillwater, Oklahoma.

Davis, R. et.al, 1991. Oklahoma's voluntary Smoke Management Guidelines. ODA., Forestry Div., Oklahoma City, Oklahoma.

Engle, D. M., Bidwell, T. G., Stritzke, J. F., and Rollins, D., 1990. Atrazine and burning in tallgrass prairie infested with prairie threeawn. J. Range Manage. 43(5)424-427.

Engle, D. M., and Stritzke, J. F., 1995. Fire behavior and fire effects on eastern redcedar in hardwood leaf-litter fires. Int. J. Wildland Fire 5(3):135-141.

Engle, D. M., Stritzke, J. F., Bidwell, T. G., and Claypool, P. L., 1993. Late-summer fire and follow-up herbicide treatments in tallgrass prairie. J. Range Manage. 46(6):542-547.

Wright, H. A., and A. W. Bailey, 1982. Fire Ecology. John Wiley & Sons, Inc. NYC, New York.

Wade, Dale D. et.al. 1989. A Guide for Prescribed Fire in Southern Forests. Technical Publication R8-TP 11.

Engle, D. M., Bidwell, T. G., 2001, The response of central North American prairies to seasonal fire. J. Range Management 54:2-10.

Table 1. Criteria for Burning

Vegetative Type and Specific Purpose	Season	Wind Velocity	Relative Humidity	Air Temp	Lbs. Fuel [1/]	Frequency of Burning
Improve Quality/Quantity of Forage for Wildlife, Livestock Grazing Distribution, and to Stimulate Seed Production						
Warm Season Grasses	late winter to	4-15 mph	30-80	30-80	2000+	as needed
	green-up					
Improve Browse or Cover Structure	mid Jan. to 3 weeks prior to green-up of browse	4-15 mph	30-80	30-80	2000+	as needed
Increase Forbs and Low Panicum Production	8/15 to 9/15	4-15 mph	20-80	30-80	2000+	Approximately 3 years depending upon need
'Jose' tall wheatgrass [3/]	early winter to green-up	4-15 mph	30-80	30-70	2000+	as needed
Mature Oak	Fall/spring	4-15 mph	30-80	30-70	2500+	[6/]
Control of Undesirable Vegetation						
Prickly Pear Cactus	winter to green-up	4-15 mph	20-80	30-80	2000+	as needed
Juniper <6' tall	winter to green-up	4-15 mph	20-80	30-80	2500+	as needed
Juniper >6' tall	winter to green-up	4-15 mph	20-80	30-80	3000+	as needed
Annual herbaceous plants	after germination	4-15 mph	20-80	30-80	2000+	as needed
Annual cool season	before area is	4-15 mph	20-80	30-80	2000+	as needed
plants	too green to burn					
Annual threeawn or broomsedge bluestem (w/20% desirable grasses) [2/, 5/]	8/15 - 11/1	4-15 mph	20-80	30-80	2000+	annually for 3-5 years or until desired results achieved
Broomsedge bluestem (w/20% desirable grasses) [2/, 5/]	late winter to green-up	4-15 mph	20-80	30-80	2000+	annually for 3-5 years or until desired results achieved
Annual threeawn (w/20% desirable grasses) [4/, 5/]	after germination	4-15 mph	20-80	30-80	2000+	annually for 3-5 years
Suppression or Maintenance of Unwanted Vegetation						
Postoak, Blackjack. and associated hardwoods	fall and spring	4-15 mph	20-80	30-80	3000+	prior to canopy closure limiting fuel loading and/or in years with heavy hardwood leaf litter with dry fuel conditions

Table 1. Criteria for Burning (Continued)

Vegetative Type and Specific Purpose	Season	Wind Velocity	Relative Humidity	Air Temp	Lbs. Fuel [1/]	Frequency of Burning
Sand sagebrush	winter to green-up	4-15 mph	20-80	30-80	3000+	three to five years
Blackberry, Sumac, Plum	winter to green-up	4-15 mph	20-80	30-80	3000+	At least every 3rd year until desired level of control is achieved. Thereafter, as needed for desired level of suppression.
Buckbrush	winter to green-up	4-15 mph	20-80	30-80	3000+	as needed
Site Preparation, control of plant disease, slash and debris removal, reduction of wildfire hazard (Forestland or Woodland). For these practice purposes, contact the Oklahoma Department of Agriculture, Forestry Services for developing and/or approving fire plans.						

FOOTNOTES

[1/] Fuel continuity must be considered along with fuel loading. If a complete burn is the objective, continuity must be high. If a mosaic burn is desired there should be areas of discontinuous fuel.

[2/] Burning during dry periods can damage the crown of broomsedge bluestem and shift the successional advantage to rhizomatous grasses as long as the desirable grasses exist. Studies are currently under way in the use of fall burning for broomsedge management. Fall burning of broomsedge bluestem will tend to break the allelopathic cycle and allow desirable plant communities to re-establish. Fall burning will reduce winter forage availability and increase the opportunity for cool season annual plants to germinate. This effect should only last the season after the burn. The standing seed crop of the annual threeawn will be destroyed if burned before the seeds fall to the ground.

[3/] 'Jose' tall wheatgrass is only approved for burning when seed production is desired or to maintain non-use fields such as Conservation Reserve Program (CRP).

[4/] Burning annual threeawn in the spring after germination will: (a) destroy the current season's germinated annual threeawn crop (reducing the abundance of a fall seed crop), and (b) tend to break the allelopathic cycle giving desirable plant communities the advantage to restart growth.

[5/] Management of broomsedge bluestem and annual threeawn should be accomplished by using fire as a tool along with soil fertility management, pest management, and grazing management to increase desired plant communities. If there are not enough desirable forage species present, such as in an old field, reseeding may be needed.

[6/] Burning in mature oak stands thins the understory and very gradually thins the overstory. Burning is best accomplished soon after leaf-drop and before leaves become weathered or get matted down by winter storms. It will take many years and multiple burns to open up the overstory with burning alone. Burning initially can prune lower limbs and scar the bark on the base of trees, which starts the process of disease invasion. Gradually, as sunlight penetrates to the ground, herbaceous vegetation increases and with prescribed grazing accumulates fuel loads for subsequent hotter burns.

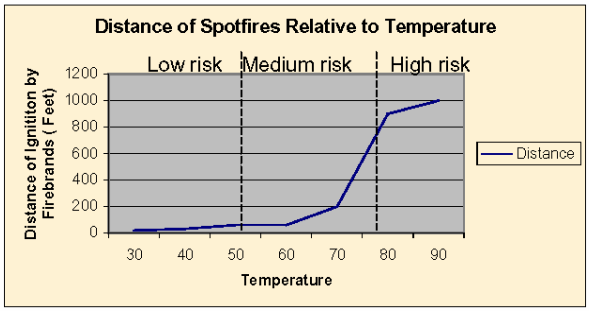

Figure 1. The maximum distance of spot fires from prescribed fires in relation to air temperature. Spotfires that started when temperatures were below 60 degrees were primarily by flaming firebrands. (From Bunting and Wright 1974)

(Risk factors have been added to the chart to offer guidelines as to the risk associated with temperature.)

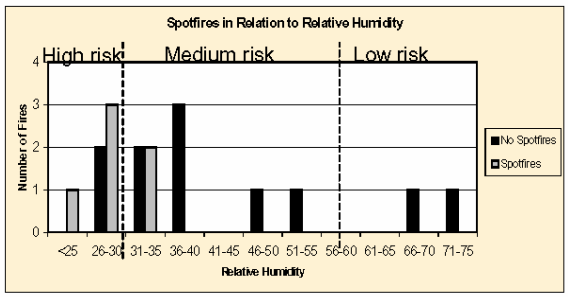

Figure 2. Spotfires were caused by fire brands from crowning cedar trees, fire brands from 60 ft. pine trees crowning, fire creeping across mowed lines, and oak leaves blown over the firebreak. Spot fires were related primarily to a critical level of relative humidity. (From Weir, 1999)

(Risk factors have been added to the chart to offer guidelines as to the risk associated with temperature.)