

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

PRESCRIBED BURNING

(ACRE)

Code 338

DEFINITION

Applying controlled fire to a predetermined area.

PURPOSE

- To control undesirable vegetation.
- To prepare sites for harvesting, planting, or seeding.
- To control plant disease.
- To reduce wildfire hazards.
- To improve wildlife habitat.
- To improve plant production quantity and/or quality.
- To remove slash and debris.
- To enhance seed and seedling production.
- To facilitate distribution of grazing and browsing animals.
- To restore and maintain ecological sites

CONDITIONS WHERE PRACTICE APPLIES

On forestland, native pasture, pastureland, wildlifeland, hayland, and other land as appropriate.

CRITERIA

General Criteria Applicable To All Purposes.

The procedure, equipment, and the number of trained personnel shall be adequate to accomplish the intended purposes as stated in the burn plan.

The expected weather conditions, human and vehicular traffic that may be impeded by heat or smoke, liability (e.g., utility lines), and safety and health precautions shall be integrated into the timing, location, and expected intensity of the burn. Obtain the latest site specific "Weather Forecast" from the National Weather Service. Current weather information can be accessed on the Internet: <http://www.netexpress.net/~okeefe/> or (<http://wxp.eas.purdue.edu>; <http://www.weather.com>; <http://intellicast.com/weather/usa/content.html> and others).

Timing of burning will be commensurate with soil and site conditions to maintain site productivity and minimize effects on soil erosion and soil properties (structure, soil moisture). Burn when the vegetation to be burned is dry enough to carry a fire well, but while the soil surface is still damp to touch. Good soil moisture helps keep the soil temperature low during the burn.

Comply with applicable federal, state, and local laws and regulations during the implementation of this practice.

A detailed burn plan of the prescribed burn area must be prepared with the landuser prior to the burn. Iowa Job Sheet Agronomy 13 can be used to document this plan. The prescribed burn plan will be developed and approved as per the Iowa NRCS policy on prescribed burns.

Liability and safety precautions are to be planned before the burn and monitored during the burn.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

Adjoining landowners will be notified prior to the burn.

Burn only when transport wind will carry smoke away from roads and residences unless adequate safeguards have been taken (traffic control, removal of residents, notification, etc.) People who have known respiratory problems should be removed from the area where smoke intrusion could occur.

Never burn within one mile of an airport, unless written permission is obtained from airport authorities.

Identify and locate on the plan map any potential hazard areas; (roads, residences, windbreaks, woodlands, electrical power poles and transmission lines, fences, flammable conduits, etc.).

Prior to the burn, firebreaks will be established that separate the area to be burned from those needing protection. A firebreak will be constructed according to specifications as stated in the burn plan. Reducing the fuel height to about 1-foot next to the fire line greatly reduces the intensity of the fire at the fire line. Removing snags and brush piles near the firebreak helps prevent fires from escaping or spotting over.

If grazing is planned, deferment following a burn will be based upon sward height. Guidance can be found in Practice Standard Prescribed Grazing (528A), Section IV of the Iowa Field Office Technical Guide.

Planning is essential to minimize risk and to ensure maximum benefits for the Resource Management System from the prescribed burn. The following items will be addressed during the planning process to ensure a successful burn.

Prior to starting a fire, the landuser should have completed all of the following.

- Inform the local law enforcement agencies and fire chief, rural fire department, or fire district of planned burns. Notify local news media such as radio, TV, and newspaper.
- Notify the sheriff or responsible authorities when planning to burn near public roads. Where needed, road guards and signs should be posted.

The Fire Boss should ensure that all persons involved in the burning procedure fully understand the burning plan. This includes when, where, and how the burn is to be conducted, including communication details.

In each prescribed burn, the landowner must be informed in writing that he/she is liable for damages resulting from the fire and cost suppression by others, should the fire escape from the designated area.

Only trained and qualified employees are authorized to provide assistance on prescribed burns. Authorized on-site assistance may include determinations relating to weather and fuel condition. NRCS staff will not drop the match, carry the drip torch, or otherwise initiate the prescribed burn.

The burn crew should wear clothing of natural materials (cotton, wool, leather, etc.) cap, gloves, and high top boots are needed. If possible all members of the burn crew should wear fire retardant, Nomex clothing.

Burn only when the wind will carry smoke away from power lines to avoid danger of electrical shock conducted by smoke.

Plan fires to burn downhill where possible.

Each person, including NRCS staff, should have a means to start a fire and should be instructed in emergency procedures if trapped by the fire. Identify escape routes.

CONSIDERATIONS

Prescribed burning is not meant to be an annual management practice. Burn only to meet a specific management objective (Table 1 provides some guidance).

Generally it is not necessary to burn more often than once every 3-5 years. When burning to control undesirable sprouting woody vegetation, it may be necessary to burn two or more consecutive years.

Burning should be managed with consideration for wildlife needs such as nesting, feeding, and cover. Large plots of land should not be burned at one time. Patches should be burned in a mosaic pattern to accommodate nesting, feeding, and cover needs of wildlife.

Existing barriers such as lakes, streams, wetlands, roads, and constructed firebreaks are utilized in the burn.

Consider cultural resources and threatened and endangered plants and animals when planning this practice.

Smoke impacts should be considered before the burn and monitored during the burn.

Weather conditions are generally more stable and favorable for burning following the passage of a weather front. Frontal passages are often accompanied by rain. Good burning conditions are frequently present 1-3 days following a rain.

Long term benefits of a burn due to a more vigorous plant community impact water quantity as follows:

Increase water infiltration and decrease runoff with a subsequent increase in groundwater recharge where geological conditions permit.

Decrease soil evaporation because of lower ground temperature and surface cover.

Increase water holding capacity of the soil due to higher soil organic matter and better soil tilth.

PLANS AND SPECIFICATIONS

Burn plans shall be planned and implemented by trained personnel with appropriate job approval authority. See Iowa Amendment #1 to National Range and Pasture Handbook.

As a minimum, a burning plan will include:

- Description of the burn area including present vegetation cover.
- Objective and timing of burn.
- Acceptable conditions for prescribed burn.
- Preparation of the area for burning.
- Requirements for equipment, personnel, and safety.
- Special precaution areas.
- Firing technique.

Purpose for Burning.

Improved forage and seed production and to improve wildlife habitat. Remove excess litter buildup to improve distribution of grazing, control undesirable herbaceous vegetation, control of broadleaf plants or noxious weeds, and reduce wildfire hazard. When wildlife habitat is the primary concern, only about 1/3 of the area should be burned in any one year to retain some vegetation as nesting, roosting, or escape cover.

Time of burning. For grass species, just as the desired species starts to break dormancy in the spring. A good

rule of thumb is to burn when the desired species, of warm or cool season grass, has one inch of new growth.

To stimulate forb components of prairie plantings, fall burns should be used. This would normally be in September to late winter.

Wildlife Habitat Management on Wetlands.

Fire may be used to thin out dense, persistent emergent wetland vegetation in order to create areas of open water for breeding pairs, feeding, brood cover, and habitat for molting birds. Only about 1/3 of the total acreage of a single basin or 1/3 of the total number of basins being managed should be burned in a single year. This will retain some vegetation as habitat for birds that nest over water and as a winter cover for other wildlife such as deer and pheasants.

Time of burning. Burn when the wetland is dry or nearly dry. Any vegetation that is moist or over open water will not usually burn. Normal dates for burning wetlands are from fall through late winter.

Burning over ice with no snow pack on the wetland is effective. A snow pack will prevent burning. Firebreaks are necessary to prevent burning more than the intended area.

Management of Woody Species. Burn to reduce invasion by woody vegetation.

Time of burning. For controlling woody species such as boxelder, mulberry, and silver maple burn in late spring when the plants to be controlled have just fully leafed out. Best control of deciduous woody vegetation is achieved when plants are less than one inch in diameter.

For controlling coniferous species such as eastern red cedar, burn from early fall into mid-spring. This will be about September 1 to May 20.

Removal of excessive plant material. Burn to reduce plant material to facilitate maintenance operations. This may be identifying hazards such as downed logs or over wash that would be hazardous for mechanical operations.

Time of Burn. Prior to mechanical operation but at a time that would not damage desired species. Spring when defined species are 1" or less in height.

Conditions for Prescribed Burning.

Burn when there is sufficient steady wind velocity (8-15 mph) to carry the fire. High relative humidity and low temperatures will often reduce fire intensity and effectiveness. Topography also influences fire spread and intensity.

Burns should be accomplished when the mulch layer and soil surface are slightly moist but dry enough to carry a fire. Generally this is 1-3 days after a rain on grassland. The relative humidity should be between 30-60 percent.

Do not burn when wind velocities are less than 5 mph or greater than 15 mph or when winds are gusty or shifting more than 45 degrees in direction. Ten to fifteen mph winds are preferred where brush management is the objective. Extra caution, for fire control, will be necessary when the humidity is low and temperatures are high.

The soil profile should contain enough stored moisture to ensure continuation of growth following the prescribed burn.

Burns should be done when the air temperature is between 40-70 degrees Fahrenheit (does not apply when burning marsh areas).

The year prior to burning, areas with small amounts of fuel or low vigor grasses should be deferred from grazing as needed, to improve the fuel and vigor of the desired vegetation. Where a full season deferment is needed, it may be necessary to improve overall management prior to the effective use of fire.

Description of Burn Terminology.

Backfire: A fire set to spread against the wind to remove flammable material and thus help to stop or control the headfire. Backfires may be used for the entire burn in some circumstances.

Fire Boss: A person that supervises all phases of the application of a prescribed burn.

Firebreak: A space which is clear of flammable materials to stop or check fires. It also serves as a line from which to work and facilitate the movement of personnel and equipment. Firebreaks should be twice as wide as the tallest adjoining herbaceous material and never less than six feet wide. Firebreaks can be either burned or cleared.

Burned Firebreak: Burned firebreaks are established along the perimeter of the burn area, taking advantage of natural barriers, mowed and raked wet lines. These boundaries may be burned in the evenings when the fire is more easily controlled. Pre-burned firebreaks shall be lit again before the headfire is started to ensure that there is not unburned fuel still present on them.

Cleared Firebreak: They are generally bare soil lines created by plowing or disking the boundary area. They

should only be used where erosion will not be a problem.

They may also be greenlines, which are prepared by mowing or grazing the vegetation to keep fuel from accumulating. A short thick stand of forage needs to be maintained.

Flankfire: The sides of a fire between the head and the backfire.

Headfire: A fire, which is set to spread with the wind and is usually, used with a backfire. Headfires should not be lit until firebreaks are established. They should be lit as rapidly as possible for the fire to be effective.

Mop Up: This is the process of checking the entire perimeter of the burn area to ensure all fires or smoldering materials are out or removed to a safe area. This includes cow chips, logs, dead trees, small areas still burning, and fence posts.

Ring Fire: This technique requires a firebreak downwind that provides adequate width to prevent escape of the fire. Once the firebreak is secure, the remaining sides of the burn should be lit as rapidly as possible. The resulting headfire will spread rapidly across the area. Ring fires are the safest because once the ring is closed and the perimeter fires are extinguished there is little chance for the fire to escape. Ring fires should be used where brush control, weed control, and mulch removal is the reasons for burning.

Strip Headfire: A technique that requires setting a line or series of lines upward from a firebreak so no single line can develop enough heat or convection to escape or cross the firebreak. The width of the strips depends on fuel type, amount, slope, and uniformity. It is most useful to widen firebreaks and burn areas adjacent to hazards (controls size of fire and amount of smoke). Its disadvantages are

the high heat concentration as the lines come together and the necessity of a well-developed firebreak.

High Volatile Fuels: These fuels have large amounts of compounds such as fats, waxes, or oils that are highly flammable and can produce firebrands or windborne flaming debris. Examples are eastern red cedar and ponderosa pine. High volatile fuels can be burned safely with proper precautions.

Low Volatile Fuels: These fuels contain small amounts of highly flammable compounds and include most grasses and hardwood trees. These fuels can burn safely within a wider range of environmental conditions than high volatile fuels.

General Procedure. Whether to use a headfire or backfire is determined by the objective to be accomplished. A headfire will produce a fast moving fire, which carries rapidly over the surface. Headfires are best for control of weeds and brush and removal of excess litter. A backfire is a slow moving, hot fire burning into the wind consuming all combustible materials, except when the mulch layer is wet. Backfires are best for firebreaks. Using a combination of the head and backfire in a ring configuration is very effective for most prescribed burns. The steps listed below are used with a ring fire.

Ring Fire.

Establish firebreaks around the entire area to be burned and those areas to be protected.

Begin burn with backfire lines. Allow them to burn upwind a minimum of 100 feet.

Extend ends of backfire up each flank. When backfire and flankfires have developed an

adequate firebreak, start headfire to burn with the wind.

Patrol fire lines to find and extinguish spotover fires from flying embers.

After the headfire and backfire meet, make sure all fire is out before leaving the area.

Post Treatment.

After the burn, protect from grazing until there is 10-12 inches of new growth.

DOCUMENTATION.

Location identification
(Field # or CTU #)

Copy of prescribed burn plan, Iowa Job Sheet Agronomy #13, or other appropriate plan form.

OPERATION AND MAINTENANCE

The kinds and expected variability of site factors (e.g., fuel condition and moisture content, weather conditions, human and vehicular traffic that may be impeded by heat or smoke, liability, and safety and health precautions) shall be monitored during the operation of this practice. Sufficient fire suppression equipment and personnel shall be available commensurate with the expected behavior of these factors during the time of burning to prevent a wildfire or other safety, health, or liability incident.

Maintenance shall include monitoring of the burned site and adjacent areas until such time as ash, debris, and other consumed material is at pre-burn temperatures.

REFERENCES

Some information from the following references was included in this standard as written.

National NRCS Policy on Prescribed Burning is found in Appendix A of the NRCS National Range and Pasture Handbook and is available at the Grazing Lands Technology Home page at: http://www.ftw.nrcs.usda.gov/glti/pdf/NRP_HAPP.PDF

Iowa NRCS Policy on Prescribed Burning can be found in "hard copy" form in this handbook and is available in the Field Office.

The following conservation practice standards and information are available at the Iowa NRCS Home page at: <http://www.ia.nrcs.usda.gov>

- Prescribed Grazing (528A)
- Prescribed Burning (338)

The following information on Prescribed Burning is available on the University of Nebraska home page at: <http://www.ianr.unl.edu/pubs/range/>.

- Grassland Management With Prescribed Fire – Nebraska Cooperative Extension EC 98-148-A.
- Management of Eastern Red Cedar on Grasslands G96-1308-A.

The following information on Prescribed Burning is available on the Kansas State University home page at:

- <http://www.oznet.ksu.edu/library/crpsl2/l815.pdf> - Prescribed Burning as a Management Practice.

- <http://www.oznet.ksu.edu/library/crpsl2/L664.pdf> - Prescribed Burning Planning and Conducting.
- <http://www.oznet.ksu.edu/library/crpsl2/l565.pdf> - Prescribed Burning Safety.

Table 1 - Criteria for Prescribed Burning

Vegetative Type	Season to Burn	Frequency of Burn
Purpose: Improve Quality of Forage for Wildlife, Livestock Grazing, and Stimulate Seed Production		
Warm Season Native Grass	April - May 15 When natives have 1/2-3" of new growth	3-5 years
Forbs	Sept - Feb	3-5 years
Cool Season Grass	March 1 - April 15 When cool season grasses have 2" or less of new growth	2-4 years
Native Prairie Remnants*	Varied	Varied
Purpose: Control Undesirable Vegetation		
Cedar Trees	Sept 1 - May 20	3-5 years Effective <5 ft. tall
Deciduous Trees and Shrubs Buck Bush Osage Orange Autumn Olive, Dogwood Sumac, Locust Others . . .	April 1 - May 15 When buds start to swell	2 consecutive years Combine with mechanical/chemical controls
Introduced Grasses	April 20 - May 20 When introduced grasses have 5-10" of new growth	1-5 years May combine with mechanical controls
Other Undesirable Plants**	Each species requires specific management	

* Native Prairie Remnants should be evaluated by an experienced prairie expert to determine the objectives of the burn.

** See reference materials or Area Office Staff for specifics.

Native Grass and Prairie References

The Tall Restoration Handbook: For Prairies, Savannas, and Woodlands, Stephen Packard and Cornelia F. Mutel (Editors),
Forward by William R. Jordan