Prescribed Burning

Iowa Job Sheet
Conservation Practice 338
August 2009

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service
www.ia.nrcs.usda.gov

Definition

Prescribed burning is fire applied to a predetermined area within a prescribed set of conditions, dates and with appropriate safety precautions to achieve specific purposes.

Prescribed burning can be applied to forest land, grassland, pasture land, wildlife land, hayland and other land uses as appropriate.

Purpose

Prescribed burns serve many purposes. They include:

- controlling undesirable vegetation
- preparing sites for harvesting, planting or seeding
- controlling plant disease
- reducing wildfire hazards
- improving wildlife habitat
- improving plant production quantity and/or quality
- removing debris
- enhancing seed production
- facilitating the distribution of grazing and browsing animals
- restoring and maintaining ecological sites
- managing native plant diversity/composition

General specifications

This fact sheet discusses considerations and background information when planning a prescribed burn. It describes burn terminology, how to prepare for a burn, the appropriate season to burn and where to go to for assistance in completing a prescribed burn. To help you better prepare, a four-page Prescribed Burn Plan form is also included.

Pre-Burn Considerations

Prescribed burning is not meant to be an annual management practice. Burn only to meet a specific management objective. Generally, it is not necessary to burn more than once every 3-7+ years (i.e. dry sites – longer interval than mesic sites). One exception is woody vegetation. It may

NRCS Photo

be necessary to burn two or more consecutive years to control undesirable sprouting woody vegetation. Other considerations:

- Burning should be managed with regard for **wildlife needs**, such as nesting, feeding and cover. Large plots of land should usually not be burned at one time.
- **Existing barriers**, such as lakes, streams, wetlands, roads and constructed firebreaks are used in the burn.
- **Cultural resources**, and **threatened or endangered plants and animals**.
- **Smoke** impacts during and after the burn.
- **Weather conditions** are generally more favorable for burning following the passage of a weather front. Good burning conditions are frequently present 1-3 days following a rain.

Burn Terminology

Backfire: A fire set to spread against the wind to burn more slowly and remove more vegetation and litter. Backfires are often used to create a black line for additional safety when a head fire is used on the same burn area.

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

Firebreak*: A space clear of flammable materials to stop fire from moving out of the burn area. It also serves as a line from which to work and facilitate the movement of personnel and equipment.

Flankfire: A fire burning across the prevailing wind direction.

Headfire: A fire set to spread with the wind. Headfires are the fastest and hardest to control. They are used to manage taller shrubs and trees, leaving the most litter unburned.

Mop Up: The process of checking the entire perimeter of the burn area to ensure all fires or smoldering materials are out. This could include cow chips, logs, dead trees and small areas still burning.

Ring Fire: A common technique that starts with a back fire, then a flank fire is lit after a safe black line is established. This is followed by the headfire, creating a fire around the entire perimeter of the burn area.

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.

High Volatile Fuels: Fuels with large amounts of compounds, such as fats, waxes or oils, that are highly flammable and can produce firebrands or wind-borne flaming debris. One example is the Eastern Red Cedar. High volatile fuels can be burned with proper precautions.

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

*Types of Firebreaks

Natural firebreaks are the most secure of all firebreaks, followed by permanent roads, bare soils and mowed firebreaks. All firebreaks should be checked by the burn boss prior to each burn. Firebreaks must be at least 15 feet in width or 4 times the fuel height, whichever is most.

- **Natural Firebreaks** - primarily lakes, rivers and larger streams; usually interconnected with other types of firebreaks.
- **Permanent Roads** - roads create a fuel free width of 15 to 20 feet. Permanent road firebreaks require no special burn day treatments, and allow rapid, safe ignition with routine ignition and holding forces.
- **Bare Soil Firebreaks** - firebreaks are tilled to bury almost all vegetation within a week of the burn date. Bare soil firebreaks should be reseeded quickly with legume species and some grasses to prevent excessive erosion risk. Bare soil firebreaks are not recommended on steep, erosive slopes or on prairie remnants or sites established to native prairie vegetation.
- **Mow-wetlined Firebreaks** - prepared by mowing as close to the ground as possible with rotary or sickle mowers beginning one year in advance to encourage enough green growth and reduce litter buildup to stop the fire.

Recommendations for Prescribed Burning

Purpose: To improve quality of wildlife habitat

Vegetative Type	Season to Burn	Frequency of Burn
Warm Season Native Grasses	April 1-May 15 (when natives have 1/2 to 3 inches new growth, less than 1 inch preferred)	3-5 years for Mesic* sites >5 years for Xeric** sites
Forbs	September 1-February 1	3-5 years
Cool Season Grass	March 1-April 15 (when cool season grasses have 2 inches or less new growth)	3-5 years
Native Prairie Remnants (depends on management objectives and community needs)	Depends on composition and objective	Depends on composition and objective

Note: Burn only 1/3 to 1/4 of site per year to provide more diversity, structure and duff.
* Mesic is characterized by a moderately moist hydrology.
** Xeric is characterized by a dry to very dry hydrology.

Purpose: To improve forage quality for grazing, haying and biomass production

Vegetative Type	Season to Burn	Frequency of Burn
Warm Season Native Grasses	April 1-May 15 (when natives have 1/2 to 3 inches new growth, less than 1 inch preferred)	3-5 years
Cool Season Grass	April 1-May 15 (<2 inches of new growth; less than 1 inch preferred)	2-4 years
Mixed Warm and Cool Season Grasses	Use above date to promote growth of declining group	2-5 years

Purpose: To control undesirable vegetation

Vegetative Type	Season to Burn	Frequency of Burn
Cedar Trees	September 1-May 20	3-5 years (effective <5 feet 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, then every 3-5 years as needed (combine with mechanical/chemical controls)
Introduced Grasses	April 20-May 20 (when introduced grasses have 5-10 inches new growth)	3-5 years (may combine with mechanical controls)
Reduce Noxious Weeds (Perennials)	Before Flowering	As Needed
Other Undesirable Plants	Varied-for specific species; seek expert advice	Varied-for specific species; seek expert advice

Pre-Burn Timetable

12 Months Prior to Burn
- Develop Prescribed Burn Plan
- Mow firebreaks bi-monthly during growing season before burn
- Remove dead trees and brush piles that are within 20 feet of firebreaks
- Scout for any safety concerns to burn crew, such as poison ivy or old fence wire

3 Months Prior to Burn
- Notify adjacent landowners/neighbors of intent to conduct a prescribed burn. Ask if residents have medical conditions that would worsen if there is smoke
- Arrange for crew and equipment needed

1 Month Prior to Burn
- Obtain necessary permits
- Clear vegetation around access points for vehicle entry to burn area

1-2 Days Prior to Burn
- Check weather forecast for day of burn
- Notify adjacent landowners/neighbors of intent to conduct prescribed burn
- Drive around site to check firebreaks and access points
- Test to insure that all burn equipment is functioning properly

Day of Burn
- Check weather forecast
- Review pre-burn checklist prior to ignition
- Ensure remnant livestock, equipment, pets are removed if needed
- Notify fire department/sheriff, etc.
- Be sure burn crew understands the implementation plan

Prescribed Burn Plan

Burn plans should be planned and implemented by trained personnel. Information about burn plans is available at your local NRCS office. For assistance, you may also contact:

- your local fire department
- Pheasants Forever
- The Nature Conservancy
- Technical Service Provider (TSP)

NRCS Photo

To stimulate growth of grass species, the best time to burn is just as the desired species starts to break dormancy in the spring. A good rule of thumb is to burn when the desired species–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 from September to late winter.

- Department of Natural Resources (DNR)
- local county conservation board

The remainder of this brochure is a sample burn plan to be used as background information. The sample plan will allow you to be better prepared for a burn, and it will answer many in-depth questions you may still have about a prescribed burn.

Helpful Websites

More information about Prescribed Burn Plans is available on the following websites:
- www.netexpress.net/~okeefe/
  (Iowa Burn Weather Forecast)
- www.fire.org/
- www.oznet.ksu.edu/library/crpsl2/
- prrcd.org/inl/prescribed_fire.htm
- www.tncfire.org
- www.iowadnr.com
- www.ecity.net/iacb/

PRESCRIBED BURN PLAN

DATE: _____ SITE/TRACT: _____

LANDOWNER/OPERATOR: _____
ADDRESSS: _____
ACRES TO BURN: _____
TOWNSHIP: _____ SECTION: _____ Burn Class: 1 2 3 4 5 6

PLANNED DATE FOR BURN: _____ EXPIRATION DATE: _____

Notification of units of government*:
Local Fire Dept.(Name) _____ (phone) _____
Sheriff/County Dispatch _____ (phone) _____

Notification of Neighbors (a month in advance plus the day before the burn)
Name: _____ Phone: _____
Name: _____ Phone: _____
Name: _____ Phone: _____
Name: _____ Phone: _____

A. DESCRIPTION OF BURN AREA*: Program/Land use: _____

A1) Woody Plant Species (list species, size, and plants/acres):

_____

_____

A2) Herbaceous Plant Species (list species, height and condition):

_____

_____

A3) Fuel Load:
Fine fuel (grass/forbs) _____ Tons/Acre _____ %Volatile Fuels _____
Predominant fuel ht. _____ Feet _____

A4) Soil Types:	Slope %	Aspect:	%Area
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

B. OBJECTIVE AND TIMING OF BURN*: (Rank if more than one)
_____ Reduce deciduous trees/shrubs (April 1–May 15)
_____ Increase warm season grasses April 1–May 15)
_____ Reduce cedar trees (Sept. 1–May 20)
_____ Reduce cool season grass (April 20-May 20)
_____ Reduce noxious perennial weeds (before flowering)
_____ Improve wildlife habitat (Only burn 1/3 of site)
_____ Distribute grazing (When warm season grasses are 1" – 3")
_____ Increase forbs/diversity (Sept 1-February 1)
_____ Remove Litter

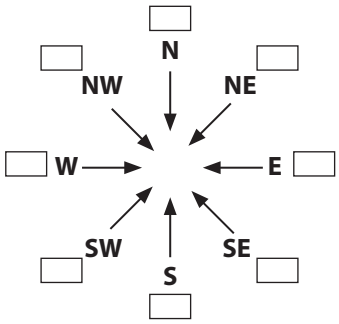
*Items Required to Meet Conservation Practice Standard 338 Prescribed Burning

Give details below if needed:

C. SPECIFIED CONDITIONS FOR DAY OF BURN*: (NOTE – All factors have to be within prescription!)
(Burn forecast is available at: http://www.netexpress.net/~okeefe/)

Preferred:	Acceptable Conditions:
_____F	1. Air Temperature 40 – 70 degrees F.
_____%	2. Relative Humidity 30% - 60%.
	3. Soil Damp to Touch as Time of Burn.
_____mph	4. Wind Speed 5 – 15mph
_____	5. Preferred Wind Direction steady from:
	6. (Acceptable Wind Direction-must enter in box; may also indicate on diagram at right with an X)

_____



D. PREPARATION OF AREA FOR BURNING* (see attached burn plan map):

- Firebreaks must be at least 15 feet in width or 4 times the fuel height, whichever is greater.
- Plowed, disked and burned firebreaks, being essentially devoid of fuel, provide least danger of fire escape.
- Frequently mowed breaks (at least bi-monthly entire growing season before burn) provide good access and facilitate control
- Mowed and cool-season grass firebreaks have fuel available that can provide an avenue for fire escape. Smoke from green growth reduces visibility, inhibiting control line monitoring.
- Regardless of firebreak used, thatch/litter accumulation of any kind can allow fire to creep out of burn unit, rake clean to reduce risk.
- Heavy fuels loads: High Mowed fire intensity reduction lines (12" stubble), will be installed if fine fuel exceeds 1.5 ton/acre. Fuel reduction line width will be at least 10 feet @ 1.5 T/A and 20 feet @ >3T/A.

1. Firebreak Construction: (type of fire line, width in feet. Also indicate on burn plan map.)

2. Existing firebreaks: (streams, roads, tilled field, etc. Show on burn plan map)

3. Items to address: (protection of power line poles, signs, cable/phone junction boxes, dead tree removal, etc.)

4. Potential Hazardous Area within Burn Area: (power lines, snags, structure, obstacles to vehicle access, plastic drain tile, underground utilities, etc.)

E. ADJACENT AREAS: (Outside of Burn Area)

1. Special Precaution Areas (also drawn on attached burn plan map):
   *leaf litter, dry grass, roads, structures, smoke dispersions, etc.
   Precautions needed: (include backup or secondary firebreaks if necessary)

2. Smoke Management Plan
   * Include smoke sensitive areas, i.e. avoid sending smoke into residential areas, neighbors, airports, hospitals, busy roadways, power lines, etc.
   * Note wind directions, which would be unacceptable for burning for each specific hazard

F. TOOLS/EQUIPMENT NEEDED*: (include type and number of rakes, swatters, drip torches, backpack pump, other)

F1. Equipment Checklist

___ 1. Pumper Truck
___ 2. Drip torch(s)
___ 3. Fire weather kit
___ 4. Tractor/Maintainer
___ 5. Two-way Radios
___ 6. Gas (40%)/Diesel (60%)
___ 7. Chain Saw
___ 8. Flappers
___ 9. Drinking Water
___ 10. Livestock sprayers
___ 11. Sprayer Fuel
___ 12. Rake(s)
___ 13. Flagmen
___ 14. Flags for flagmen
___ 15. NOAA radio
___ 16. Matches or lighter
___ 17. Backpack Sprayers
___ 18. All cotton clothing/NOMEX
___ 19. Shovel(s), pliers
___ 20. Cellular phone

F2. Preburn protection needs

___ 1. Remnant Livestock
___ 2. Feeders
___ 3. Pens and Barns
___ 4. Utility Poles
___ 5. Oil/gas/pipelines
___ 6. Fences
___ 7. Hunting Facilities
___ 8. Headquarters
___ 9. Desirable wooded areas
___ 10. Windmills
___ 11. Water Storage Facilities
___ 12. Special habitat areas
___ 13. Haystacks
___ 14. Equipment
___ 15. Liability insurance
___ 16. Critically eroding areas
___ 17. Livestock working fact
___ 18. Vehicles
___ 19. Inspection of fireguards
___ 20._____

Additional equipment or considerations:

G. PERSONNEL REQUIRED FOR BURN*:

(Include number of people and their role. It's recommended that burning be done by certified personnel.)

Position	Name
Fire Boss	
Igniter	
Igniter	
Pumper/Sprayer	
Pumper/Sprayer	
Pumper/Sprayer	
Suppression Crew	
Suppression Crew	
Suppression Crew	
Weather/Communications	

H. SPECIAL CONSIDERATIONS:
Precautions to prevent fire escape:

_____

_____

_____

I. SUPPRESSION PLAN IF FIRE ESCAPES: (NOTE any contingency plans, i.e. secondary firebreaks: creeks, roads, disked breaks, authorities to contact. Provide burn map to fire dept. noting field access, hazards, etc.)

_____

_____

_____

J. PATROL AND MOP-UP PLAN:

- Patrol entire perimeter of burned area, put out all flames and smoke within 20 feet of burn line
- Pay special attention to smoldering leaf/litter, dung pats, course woody debris, corn cobs or other coarse fuels.

_____

_____

_____

K. IGNITION PLAN*: (see attached burn plan map)

1) Ignition Time (avoid variable winds, usually occur late morning): _____

2) Method of Firing/Firing Sequence (describe below):(backing fire, flank fire, head fire, strip head, etc. also indicate on map)

_____

_____

PRESCRIBED BURN PLAN MAP
(Attach aerial photos, topographic map or line-drawing if scale is appropriate)

Suggested legends for indicating pertinent information on aerial photo or topo map.

Approximate Scale: Inches per_____ **Legend** mile: _____
Or: Inches per_____ feet: _____

B-B-B-B-B-B-B	Burned Firebreak	IP	Ignition point
P-D-P-D-P-D-P	Tilled/Mowed Firbreak	W	Water Source
CS-CS-CS-CS	Cool Season Grass Firebreak	A,B,etc.	Fire Crews
HM-HM-HM	High Mowed fuel intensity reduction line	1,2,etc	Firing Sequence
		(A1)>>>	Firing Direction
		WIND--->	Wind Direction

Other legend information

_____

_____

Plan Prepared by (name and organization):

_____ Date: _____

_____

Signature*: _____ Date: _____

Plan addresses all items required in the Conservation Practice Standard (338 Prescribed Burning):
NRCS Signature: _____ Date: _____

IF BURN PLAN EXPIRED BEFORE IMPLEMENTATION, PLAN HAS BEEN REVIEWED AND RECERTIFIED BY (PREPARER):

Signature: _____ Date: _____

Landowner acknowledgement and acceptance of burn plan preparation and liability*
I, _____ have requested the preparation of this prescribed burn plan; my signature establishes my acceptance of full liability resulting from the implementation of this plan.

PRESCRIBED BURN CHECKLIST

(To be reviewed and filled out DAY OF BURN)

NOTE: Parties igniting a prescribed burn may be liable for damages resulting from the fire and control cost, should fire escape the designated area.

A. Pre-burn Checklist*: (Day of Burn)

1. Weather forecast favorable: http://www.netexpress.net/~okeefe/) YES___ NO___
2. Necessary firebreaks constructed YES___ NO___
3. Potential hazards accounted for YES___ NO___
4. Special precaution areas noted YES___ NO___
5. Backup/secondary firebreak locations noted YES___ NO___
6. Safety equipment adequate YES___ NO___
7. Tools/equipment on-site YES___ NO___
8. Personnel needed available YES___ NO___
9. Special considerations reviewed with crew YES___ NO___

IF ANY OF THE ABOVE ARE ANSWERED "NO", DO NOT BURN

10. Actual weather at burn:

Acceptable Conditions:	Preferred:	Actual:	Time Recorded:
1. Air Temperature 40-70 degrees F.	F_____	_____	_____
2. Relative Humidity 30%-60%	%RH_____	_____	_____
3. Soil Damp to Touch at Time of Burn			
4. Wind Speed 5-15 mph	mph _____	_____	

5. Acceptable Wind Direction steady from: _____ YES___ NO___
6. Preferred Wind Direction steady from: _____ YES___ NO___
7. Actual wind Direction: _____

11. Fronts or changes expected? YES_____ NO_____

12. Notification of units of government made:
Local Fire Dept.(name) _____ phone: _____
Sheriff/County Dispatch _____ phone: _____

13. Notification of Neighbors
Name:_____ Phone:_____
Name:_____ Phone:_____
Name:_____ Phone:_____
Name:_____ Phone:_____

14. Necessary permits obtained (if any): YES_____ NO_____
Additional Comments: _____
_____

Checklist completed by: _____ DATE:_____

B. Post-burn Evaluation* (Day of Burn):

1. Burning method used
2. Start of burn — Beginning Time: _____ a.m. (_____) p.m. (_____)
   Mop Up Completed — Ending Time: _____ a.m. (_____) p.m. (_____)
3. Observed change in weather conditions during the burn:

_____

_____

4. Fire behavior: (check one)

a. Spotting	none(_____)	few(_____)	many(_____)
b. Difficult to control		yes (_____)	no (_____)
c. Convection column		yes (_____)	no (_____)
d. Fire whirls		yes (_____)	no (_____)

5. Objective of burn met: yes (_____) no (_____)

6. Post-burn management plan (additional treatments needed):

_____

_____

7. Future burn needed Yes (_____) No (_____)

8. Other comments:

_____

_____

Evaluation Completed by:
Signature: _____ Date: _____

***Items Required To Meet Conservation Practice Standard 338 Prescribed Burning**