NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE SPECIFICATION

PRESCRIBED BURNING

(Ac.)

CODE 338

Livestock Grazing: On areas to be burned will be managed to ensure that forage plants are in a high state of vigor and that they will provide adequate fuel to carry the fire with continuity. When brush suppression is the objective, the fuels shall be evenly distributed to carry the fire. Deferment may be necessary prior to the burn to obtain desired fine fuel amounts.

It is the landowner's responsibility to register prescribed burns with the New Mexico Environment Department/Air Quality Bureau and to comply with all federal, state, local and county regulations and ordinances.

The web site containing **New Mexico Air Quality regulations** can be accessed at the following web address. http://www.nmenv.state.nm.us/aqb/projects/openburn/vegetation_burning.html

Smoke Management Plan I & II (SMP) prescribed burns over 10 acres and/or 1000 cu ft. pile volume per day must be registered with the NM Environment Department Air Quality Bureau. The forms for the Smoke Management Program are available at: http://smoke.state.nm.us to submit forms. There are links to instructions for the forms, and to the daily fire map.

On State Land a copy of the burn plan is to be submitted with the application for improvement.

State Forestry: Planners are strongly encouraged to cooperatively plan all prescribed burns with State Forestry. At a minimum State Forestry must be allowed to review all prescribed fire planning on state and private lands. The URL is; http://www.emnrd.state.nm.us/fd/Index.htm

It is the landowner's responsibility to notify all neighbors, fire departments, sheriff departments, utility companies, oil companies, etc. prior to the burn.

Utilities: Consider the location of utilities such as electric power lines and natural gas pipelines to prevent damage to the utility and avoid personal injury from electrical discharge into smoke or ignition of gasses. Notify utility company personnel before prescribed burn operations are to begin. They can implement contingency plans that minimize hazards to people and resources in and near the burn area.

Weather: Get a 1 and 2 day outlook for weather conditions from the fire weather part of the National Weather Service. (The N.W.S. number in Albuquerque, NM is (505)244-9148) or NOA Western U.S. Fire Weather Forecast on the Internet at http://www.srh.noaa.gov/abq/?n=forecasts-fireweather .

On site fire weather monitoring is mandatory during firing and suppression operations.

Hydrophobic Soils: Where burned areas include brush piles or downed trees that are expected to burn for a longer than normal period of time or higher intensity a risk of creating hydrophobic soils exists.

These areas are created where soil organic matter is oxidized and a impermeable layer to water intake is created. This layer is easily broken up by animal traffic or hand tools.

Seeding of these areas should be considered post burn in the process of breaking up soil caps.

Where **natural barriers** (lakes, streams, wetlands, or roads) do not exist constructed firelines and blacklines will be used to control burns and allow access for suppression equipment. They are to be installed prior to the burn.

In all cases where prescribed fire will be used the Firebreak standard (394) and/or Fuelbreak standard (383) will be used to retard fire spread and create manageable divisions within the main body of the prescribed fire.

Pile Burning: Where downed trees and brush piles are located near the fire perimeter an increased hazard of fire escape is created. To manage this hazard all brush piles and dead and down trees will be moved to an area within the black line and mineral lines. Alternatively an expanded firebreak/fuelbreak can be used to separate piles and downed trees from the prescribed burn area.

Sizing Mineral and Black Lines: A rule of thumb on sizing mineral and black lines is 1 – 1.5 times the fuel height for the mineral line and 100 ft – 500 ft for the black line and shredded line in combonation. Black line width depends on fuel load, fuel moisture fuel structure, wind direction and intensity (The guideline is estimate maximum expected flame length and multiply by three for black line width) At least 2 times this minimal distance will be required for especially large piles or high volatile fuels. Where high volatile fuels are on both sides of the line then a minimum of 700 feet separation will be required. Mineral lines are to be bladed, dozed, disked, etc., down to mineral soil. When grading mineral lines, rolls of soil and vegetation material will be left on the side of the mineral line opposite the fire.

Reduce Fuel Height (Shredding)

Flame heights are directly related to the height of the fuel being burned. Mowing or shredding to reduce the height as much as possible will lower the height and intensity of the fire. Where this is a concern, mow or shred a strip around the edge of the burn area, inside the mineral line. This strip may be 50-70 feet wide depending on fuel loads. This width is necessary to provide room to move equipment and personnel in the mowed area.

Once the fire gets to the tall unmowed area flame heights are often so high that working close is impossible because of the heat. Crews will work safer and easier in the mowed strips.

Develop these strips in the fall so the residue will settle down and partly decompose. Shredding cuts plant residue into smaller pieces than mowing with a sickle bar mower. These small pieces settle to the ground better and make fire control easier. Thus shredding is more desirable than using a sickle bar mower.

If the site is next to roads, fields, and other areas that will not burn or have low volatility, the width of the mowed strip may be reduced. However, the area needs to be wide enough for all personnel and equipment to work the fire and put unwanted fires out without getting close to or into the tall fuels.

Use caution when mowing or shredding so that equipment does not start an unwanted fire. Check equipment to make sure there are no hot bearings, low slung exhaust pipes, or other components that can start a fire. Mow or shred under conditions of high humidity and low temperature.

Shredders that throw residue to one side are best because they leave a strip that will have less fuel to burn. This area can be the initial starting strip in the ignition process. Side delivery rakes can be used to move the excess residue against the unmowed grass. This will leave a clean area. However, it will be difficult to work close to the fire in the windrow because of the heat generated.

Shredded lines will be very closely monitored during all firing activities.

Follow manufacturer's label when fire retardants are used to build blacklines.

Blacklines will be 100 feet or more wide for low-volatile fuels. (grasses, shrubs, and green trees)

Blacklines will be 500 feet or more wide for highly-volatile fuels. (juniper)

Blacklines will be 700 feet or more wide for extremely-volatile fuels. (Tamarisk)

When blackline burning or burning high fuel areas, day time temperature should not exceed 70 degrees Fahrenheit, wind speeds should not exceed 6 mph. nor be less than 3 mph., and the relative humidity should not be less than 30%.

Tamarisk black line burn rules are as follows:

1. 10 foot dozed line placed around the entire unit on the area of the fire line furthest from the fire area. This location is important so that the mineral line becomes the last line of defense if the fire attempts to escape containment.
2. 700 foot black line burned downwind of the prevailing wind direction.
3. Fire line air temp of 39 to 61 degrees F.
4. Relative humidity of > 40%
5. Wind Speed of less that 10mph.
6. 10 hour TLFM >=8%.

Dispose of (burn or remove) any brush piles or highly combustible material in the area to be burned to reduce hazards of firebrands. Check all firelines for "fuel bridging" on areas not cleared to mineral soil.

The fire boss must:

1. Answer go to all questions on the go/no go checklist prior to igniting the test fire.
2. Review the burn plan with the fire crew prior to ignition.
3. Establish & review escape routs and safety zones with burn fire crew.
4. Conduct a test fire prior to the burn to determine if the fire is going to accomplish the objective in a safe manner.
5. Be in charge of the burn at all times. Continually assess the progress of the burn, make needed adjustments, keep the fire crew informed of decisions, progress, and changes made during the fire.
6. Be highly mobile.
7. Monitor firelines continuously.

One person on the burn crew will be designated as the **fire weather person.** This person will continuously monitor weather factors affecting the fire - wind direction and velocity, relative humidity and air temperature during the course of the fire. No more fire should be burning at one time than can be controlled by on-hand equipment and crew.

When planning and implementing ignition sequences be aware that fire whirls are readily created by converging fire fronts. Ignition sequences must be planned to minimize or eliminate zones where fires converge near burn area boundaries.

When conducting a main **headfire** burn the maximum and minimum and optimum values for temperature, wind speed and relative humidity are shown in attachment 1. This attachment also covers recommended frequency of burn return interval for some species and management purposes. Planners are to use the optimum values for prescription purposes.

Do not burn (Red Flag Conditions):

- log littered areas if the weather forecast is for strong winds **within 3 days** after the burn.
- when a weather front is expected during the burn, or winds are light (less than 4 mph) and variable.
- when air temperature exceeds 80 degrees F (100 degrees F for Tamarisk).
- when wind velocities exceed 20 mph.
- relative humidity is less than 10 percent (and 10 hour Time Lag Fuel Moisture (TLFM) <= 4% for Tamarisk).

To assess spotfire risk and coping strategies see Table 1.

OPERATION AND MAINTENANCE

The fire boss must maintain close observation of the burn area until the fire is extinguished. Stumps and dry manure may smolder for several days after the burn. Be especially careful with burning material that is within 50 feet of the perimeter of the burn area.

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

All fire fighting equipment should be tested prior to starting a fire.

Deferment of livestock grazing will be necessary after the burn for at least one growing season to obtain recovery of ground cover and vegetation health.

REFERENCES

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

G. McPherson, Allen Rasmussen, Henry A. Wright and Carlton M. Britton, Getting Started in Prescribed Burning, Management Note 9, Texas Tech University, Lubbock, TX, 1986. http://www.tpwd.state.tx.us/publications/nonpwdpubs/media/prescribedburn.pdf

G. Allen Rasmussen, Guy R. McPherson and Henry A. Wright, Prescribed Burning Juniper Communities in Texas, Management Note 10, Texas Tech University, Lubbock, TX, 1986. http://www.rw.ttu.edu/fec/old%20site/Prescribed%20Burning%20Juniper%20Communities%20in%20Texas.pdf

Carlton M. Britton, Henry A. Wright, Bill E. Dahl, and Darrell N. Uecket, Management of Tobosagrass Rangeland with Prescribed Fire, Management Note 12, Texas Tech University, Lubbock, TX, 1987.

New Mexico State Forestry, Guidelines for Prescribed Fire in New Mexico, January 1992.

Dr. Brent Racher, Carlton Britton, and Rob Mitchell, Fire Application to Saltcedar – Dominated Riparian Areas: Prescription Development, Hazardous Fuels reduction and ecosystem Response, Texas Tech University, Lubbock, TX. 2000

Forest Fire: Control and Use, Kenneth P. Davis. McGraw-Hill Book Company, Inc, New York, 1959

Fuelbreaks and Other Fuel Modifications for Wildland Fire Control, Agriculture Handbook No. 499, USDA-Forest Service, 1977.

Guidelines and Criteria for Wildfire Hazard Areas, Colorado State Forest Service and Colorado State University, Fort Collins, Colorado, 1974.

Vollmer, Jennifer. New Technology for Fuel Breaks and Green Strips in Urban Interface and Wildland Areas. Eighth International Wildland Fire Safety Summit, Missoula, Montana April 26-28, 2005.

http://www.iawfonline.org/summit/2005%20Presentations/2005_posters/Vollmer.pdf

Abstracts, Briefs, and Minutes from the Second Wildland Fire Ecology and Management Congress. http://ams.confex.com/ams/FIRE2003/techprogram/paper_65283.htm

Agee, et. al. The Use of Fuelbreaks in Landscape Management. http://www.qlg.org/pub/miscdoc/agee.htm

E-927- Using Prescribed Fire in Oklahoma Terrence G. Bidwell et. All. http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-2563/E927web.pdf

Good Fire, Bad Fire-How to think about forest land management and ecological processes Merrill R. Kaufmann, et. All. http://csfs.colostate.edu/pdfs/Good_Fire_Bad_Fire.pdf

New Mexico Fire Information Web Site: http://nmfireinfo.wordpress.com/

Smoke Management Guide for Prescribed and Wildland Fire, 2001 Edition. National Wildfire Coordinating Group http://www.nwcg.gov/pms/pubs/SMG/SMG-72.pdf

The Rainbow Series, A series of reports on the effects of wildland fire on ecosystems. USDA Forest Service, Missoula Fire Sciences Lab http://depts.washington.edu/nwfire/project.php?projectID=358&microweb=0

PRESCRIPTION DEVELOPMENT FOR BURNING TWO VOLATILE FUEL TYPES By DR. BRENT RACHER, http://etd.lib.ttu.edu/theses/available/etd-07312008-31295018636786/unrestricted/31295018636786.pdf

Attachment 1

CONDITIONS FOR BURNING AND FREQUENCY OF BURNING

VEGETATIVE TYPE AND SPECIFIC PURPOSE	SEASON		WIND VELOCITY		RELATIVE HUMIDITY		AIR TEMP. ^{O}F	FREQUENCY OF BURNING
	Optimum	Max. Range	Optimum	Max. Range	Optimum	Max. Range		
	***1/**	***2/**						
1. CONTROL OF UNDESIRABLE PLANTS								
Sprout and seedlings of juniper, mesquite, prickly-pear, and cacti; broom snakeweed, sagebrush;	3/1 to 4/1	2/15 to 5/1***3/**	8-15 mph	8-20 mph	20-30	10-50	70-80	As Needed
Tamarisk ****	3/1 to 6/1	2/1 to 7/1	6-10 mph	3-14 mph	30-45	20-45	45-95	As Needed
2. IMPROVE QUALITY OF FORACE FOR LIVESTOCK								
(a) Tobosa, sacaton	3/15 to 4/15	2/15 to 5/1	6-10 mph	6-15 mph	30-50	25-60	45-60	10 yrs. on Uplands 7 yrs. on Lowlands
(b) Weeping lovegrass	3/1 to 4/1	2/1 to 4/15	6-10 mph	6-15 mph	30-50	25-60	45-60	6 yrs.
3. IMPROVE QUALITY OF HABITAT FOR WILDLIFE								
Improve availability and quality of browse	3/1 to 4/1	2/15 to 4/15	8-12 mph	8-20 mph	25-40	20-40	70-80	As Needed

**** For Headfires in Tamarisk the 10 hour TLFM <= 5%.

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*1/Immediately prior to initial green up of the herbaceous forage plant being managed.

*2/ Areas that landowners or operators manage for specific bird habitat should not be burned during the nesting seasons.

***3/** On broom snakeweed and big sagebrush a mid to late June burn may be advantageous. These areas and times will be closely evaluated on a case-by-case basis.

Table 1 Spotfire risk and planning strategy

Spotfire Risk	Burning Conditions	Planning Considerations and Guidelines
Low Risk	Air Temperature: < 60º F Relative Humidity: >40% (60:40 Rule)	The probability of spotfire occurrence is <5% chance. Spotfires will typically be at distances <100 feet from the prescribed fire (depending on the wind velocity). The minimum total width of the downwind firebreak should be 100 ft. for burns which are planned under these conditions. If the burn cannot be applied under these conditions (actual conditions on day of burn different than planned), additional width should be incorporated in the firebreak, additional crew members should be present and located as spotters at vulnerable locations, and additional equipment should be on hand to manage the increased potential for spotfires. The burning of brush piles should be safe if they are located well within the burn area.
Medium Risk	Air Temperature: 60-75º F Relative Humidity: 30-40%	The probability of spotfire occurrence is ~25% chance. Spotfires can be started by flaming firebrands and easily carried downwind up to 500 feet. The minimum total width of the downwind firebreak should be 500 ft. for burns which are planned under these conditions. If the burn cannot be applied under these conditions (actual conditions on day of burn different than planned), additional width should be incorporated in the firebreak, the presence of additional crew members is suggested so that extra spotters can be located at vulnerable locations, and additional equipment should be on hand to manage the increased potential for spotfires. Utilize the strip-head-firing technique to burn smaller areas to increase blackened areas for safety. The burning of brush piles will be risky and likely cause increased spotfires for long distances. Use extreme caution if brush piles are involved.
High Risk	Air Temperature: >75º F Relative Humidity: <30%	The probability of spotfire occurrence is ~50% chance when the relative humidity is between 25-29%. When the relative humidity is <25%, there is a 100% chance that spotfires will occur. Spotfires are significantly more common and firebrands can travel at distances up to and exceeding 1000 feet downwind. The minimum total width of the downwind firebreak should be 1000 ft. for burns which are planned under these conditions. If the burn cannot be applied under these conditions (actual conditions on day of burn different than planned), additional width should be incorporated in the firebreak, the presence of additional crew members is essential so that extra spotters can be located at vulnerable locations, and additional equipment must be on hand to manage the increased number of spotfires. It is critical that smaller areas are burned utilizing the strip-head-firing technique to increase the size of the blackened areas for safety. A consideration is to burn the entire area with strip-head-fires or let the whole area burn with a backfire. Another consideration would be to postpone the burn and wait for safer conditions. The burning of brush piles will be exceptionally risky and is not recommended under these conditions.

Burns with higher temperatures and lower humilities are for experienced fire bosses and fire crews. The concern is how large the spotfire gets before it can be stopped. This will depend upon fuel load, wind speed, crew size, crew experience, dependability of equipment, and how soon the spotfire is discovered. The primary question that the fireboss should ask before lighting the fire is “Can the fire crew control this fire if it escapes