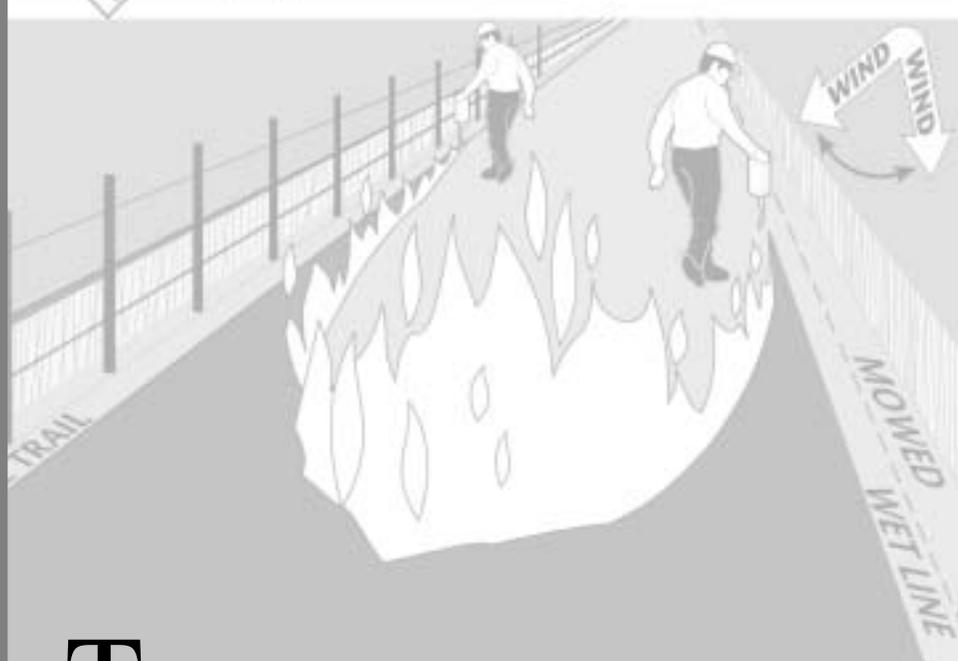


for smoke
damage

30°



Prescribed Burning Planning and Conducting



The role of fire has come full circle in managing the grasslands of the Great Plains. Wildfires occurred naturally before the settlers arrived. As settlements grew and the rangeland was plowed and fenced, the wildfires became smaller and less frequent. Over the years, some ranchers and researchers have continued to work with fire. Research and experience have shown that when properly applied, fire can benefit not only the grassland but also the animals that graze it.

With the benefits fire can provide also come dangers. Many dangers can be minimized by careful planning weeks or months in advance. A plan for burning should outline weather conditions, manpower, equipment, and other needs as well as how to conduct the burn.

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Cooperatively developed by
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Experiment Station and Cooperative
Extension Service,
Natural Resource
Conservation Service-USDA, and
Kansas Department of Wildlife and
Parks

Planning the Burn

Planning the burn involves determining what to burn and why, how, when, precautions to take, and conditions for a successful burn. The burn then can be carried out quickly when conditions are right.

Area Inventory

Using an aerial photo or map of the area to be burned, draw in all features such as fences, buildings, powerlines, water sources, roads, and gates. This should include access routes to all parts of the area and to neighbor's property. Note features on the boundary of the planned burn area that will affect how to conduct the fire. These include steep slopes, impassable areas, fields, streams, rock ledges, livestock trails, roads, nearby buildings, and others. Next, mark areas that can be developed for firebreaks, either burned or cleared; areas to be protected such as buildings and windbreaks; and areas which can best serve for setting the headfire.

Once this inventory is complete, it is possible to make decisions considering the other important factors.

Weather Conditions

Weather has an overriding effect on a prescribed burn. Wind direction and speed, frontal passages, precipitation, relative humidity, and temperature affect how the fire will behave and how it should be conducted.

Consider wind direction and speed when evaluating the wind needed for a good burn. A wind speed of 5-15 mph is an ideal range for late spring burning. It is adequate to

allow the headfire to move across the soil surface fast enough to remove excess litter and accumulated growth. Physical features of the burn area determine the best wind direction. In general, choose a direction with the least hazards downwind. Consider natural barriers such as streams, rock ledges, fields, tree lines, and little used roads including pasture trails as ideal locations for fireguards. Locations with major hazards -nearby buildings, roads, highways, power lines and towns—as areas for the fire to move away from.

The Weather Bureau issues 24- and 48-hour forecasts, including temperature, wind direction and speed, anticipated wind changes, precipitation chances, and relative humidity. Weather information can be obtained from local radio stations, TV news reports, or the National Oceanographic and Atmospheric Administration (NOAA) Weather Radio.

Local radio stations and TV news should be used for obtaining 3- to 5-day outlooks to establish the exact burn date. Their reliability for accurate 24-hour forecasts varies greatly.

The Rangeland Fire Danger Index is a part of all weather forecasts during periods of dry weather. Five factors important to the ignition and spread of fire are used in computing the index. They are temperature, humidity, wind speed, cloud cover, and percent of green. Five categories are defined: low, moderate, high, very high, and extreme. The levels have the following meaning for prescribed burning:

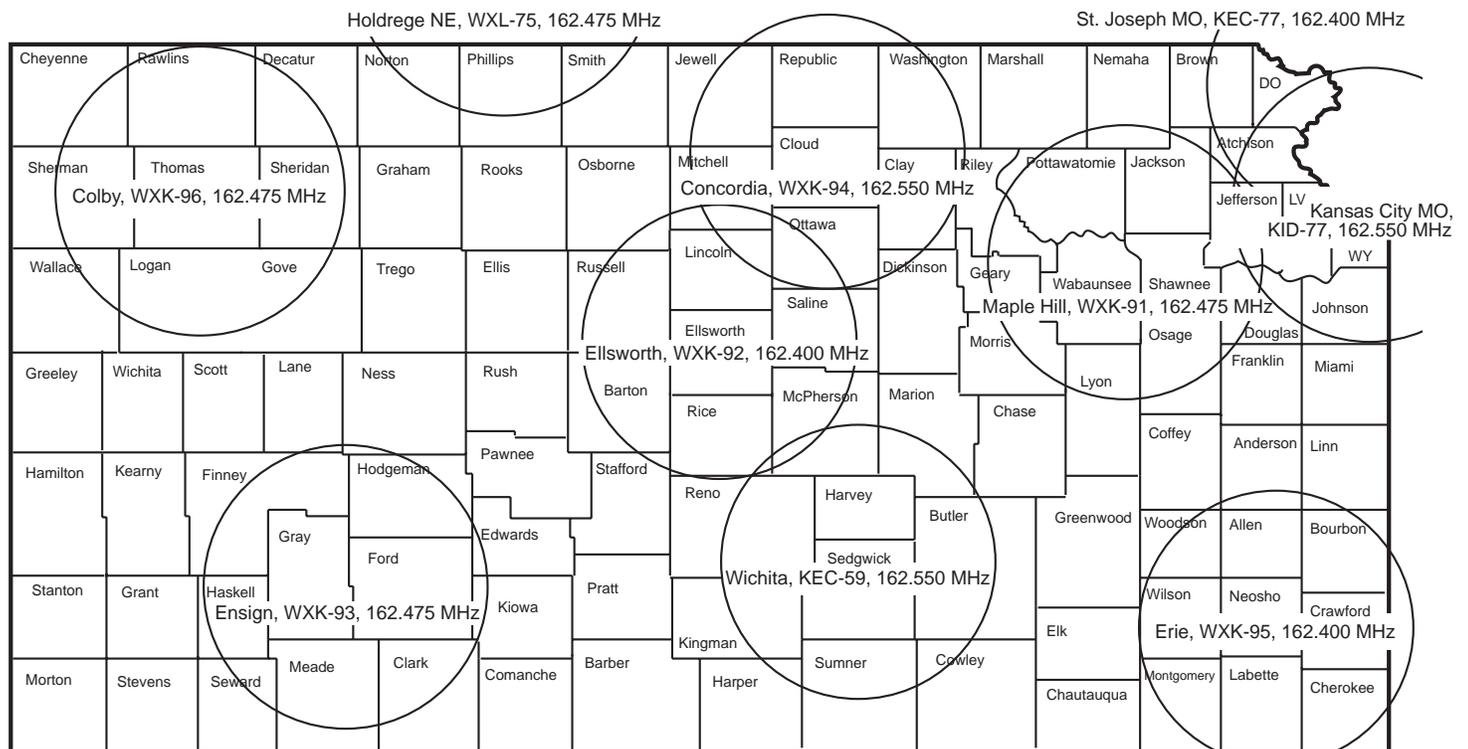


Figure 1. Locations of the broadcast towers for NOAA Weather Radio stations in Kansas. The circle around each location represents the approximate boundary of the major reception area. Each station can be received outside the designated area if receiver is on higher ground.

Low. Virtually impossible for a fire to occur; precipitation or high humidity will prevent the ignition and/or spread of fire.

Moderate. Best conditions for a prescribed burn. Weather parameters are within acceptable and legal limits.

High. Marginal conditions for a prescribed burn. Wind speed or humidity will be beyond acceptable limits, reducing the chances of controlling the fire.

Very High or Extreme. DO NOT BURN! When these forecasts are issued, atmospheric conditions are such that a fire will move extremely fast and be large and hot. Control of fires using normal fire-fighting tactics will be extremely difficult if not impossible. Avoid burning under these conditions.

The best source of weather information is NOAA Weather Radio. Weather Radio is a 24-hour broadcast of the current weather conditions and forecasts. These broadcasts are received on special radios at three different frequencies (Figure 1). Weather radios are available from many sources.

As the time of burning approaches, listen to forecasts several times a day, especially late afternoon and evening forecasts. Make judgments on the basis of the forecasts and modify the plan according to existing conditions.

Regulations and Safety

A safe burn involves planning, skill, and experience as well as knowing safety requirements and state regulations. To ensure that legal requirements are met, be aware of state regulations listed below. See "Prescribed Burning Safety," L-565, for safety measures. It is available from county Extension, Soil Conservation Service, or Wildlife and Parks offices.

Manpower and Equipment

Once the plans for firebreak placement and headfire lighting are complete, estimate manpower and equipment needs. Neighbors often work together to burn so that everyone has as much help and equipment as possible. A minimum crew should be four people: one to light the fire, one to drive the sprayer, one to handle the sprayer hose, and one to follow up and make sure all fires are under control. By pooling labor, equipment, and experience, a larger and better equipped crew can burn an area faster and safer. Examine and repair all equipment before the burn to ensure workability.

Notification

State regulations require that the local fire department be notified before burning. Also, check with local authorities to determine if other requirements are needed before burning. For both safety and legal reasons, certain groups should be notified before a burn to prevent unnecessary concern and danger. Notifying neighbors, the fire department and law enforcement officials is part of the prescribed burning process. Such notification can prevent misunderstandings, unnecessary fire calls and poor public relations. The procedure discussed here has been developed based on state regulations, experience and common sense

Neighbors. Notifying neighbors of a burn can accomplish several things. It provides opportunities for cooperation in burning, and for sharing labor and equipment if prescribed burning is common in the area. Likewise, it helps in determining attitudes and finding help if prescribed burning is being introduced.

Fire department. Working with the fire department is crucial. Contact the fire chief to determine local regulations and how to request emergency help. Determining which neighbors, if any, report all fires also will help avoid problems.

Law enforcement. The need to notify local law enforcement personnel varies with the burn location and the hazards. Discuss the location with law enforcement officials to determine what to do.

The Notification Procedure

Three separate notifications are necessary: 1) the intent to burn; 2) before the burn begins; and 3) after the burn is complete.

Intent to burn

Well before the actual burn time, prepare a list of all neighbors, the fire department, and law enforcement officials. A suggested form is on the back page of this publication. List and contact any neighbor who has property adjoining or close to the burn area. Inform each of the intent to burn, the approximate date, and precautions taken to protect their property. For future reference, note reactions to initial contact.

Contact the fire department to determine current county burn policy, to develop procedures for obtaining emergency help during the burn, and to review the burn plan.

Contact law enforcement officials to determine the extent of their involvement.

Before the burn

The morning of the burn, begin notification by contacting each neighbor. The message should be similar to the following:

"We will begin our prescribed burn about (time). If you see a fire before that time, report it to the fire department. If you see a fire other than ours during our burn, report it to the fire department including the specific location and the fact that it is not our burn."

At the time the burn begins, notify the fire department with a message similar to the following:

"We are beginning our burn at (location). All neighbors have been notified and will only report fires other than ours. If we need your assistance, (name) will call and request it at the exact location of the fire."

Prepare a written statement to request emergency assistance. Wording should be similar to the following:

(Fire department name and number)

"This is (name). We need the fire department at our prescribed burn at (location). Please come to (exact location of emergency)."

Do not hang up after delivering the message. Remain on the phone to answer questions for the fire department.

Use a similar procedure for law enforcement if required.

After the burn

When the prescribed burn is complete, repeat the notifications using the procedure outlined below. After all mop up operations are complete, immediately notify the fire department with a message similar to the following:

“This is (name). We have completed our prescribed burn at (location) and will begin notifying our neighbors. If any fires are reported, please respond immediately.”

Immediately notify neighbors, beginning with those closest to the burn area. Use a message similar to the following:

“We have completed our prescribed burn at (location). If you see a fire, call the fire department immediately. If you believe the fire is a result of our burn, call me after you call the fire department.”

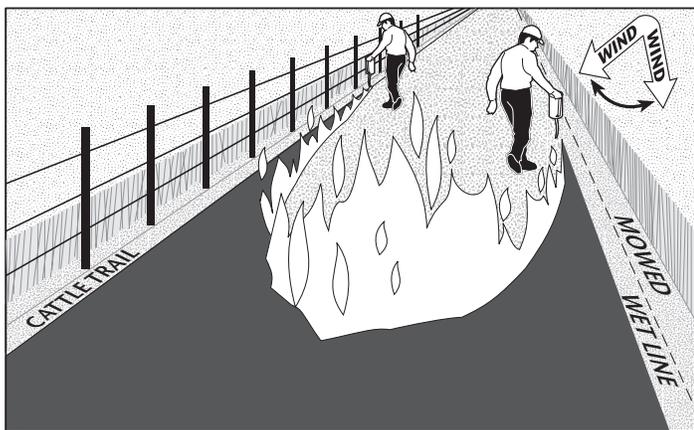


Figure 2. Firebreaks are a key part of prescribed burning. Begin by lighting next to a natural barrier (cattle trail) and moving into the wind. Ensure that the resulting headfire does not cross the downwind barrier.

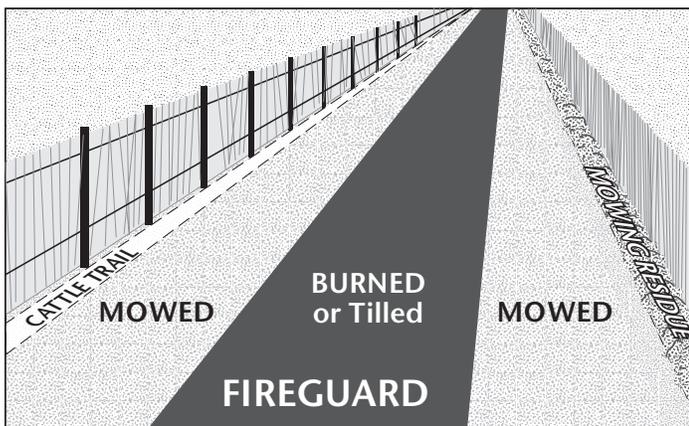


Figure 3. When mowing the edges of the burn area, the minimum width mowed must be at least six feet, or twice the height of nearby vegetation, whichever is greater. This is necessary to prevent seed stalks or weed stems from falling across the mowed area, providing an escape route for fire when the area is burned.

If necessary, make a similar call to law enforcement personnel.

The notification process outlined here is designed to protect those conducting the prescribed burn as well as the public. Careful planning and notification will help to maintain good relationships with neighbors and emergency personnel.

Conducting the Burn

As time for the burn nears, final preparation requires following weather forecasts to set the date of the burn more accurately. Also, determine exactly who will be able to help and what equipment will be available.

Weather forecasts are issued several times daily. Primary concerns for the burn are temperature, relative humidity, wind direction and speed, and predicted changes in each. Be sure to adapt the forecast to local conditions.

Follow the Plan

On the day of the burn, assemble the crew and review the plan. Each crew member must be familiar with the basic safety requirements, communication methods, equipment uses, and other information. Test equipment before lighting the fire. Begin the burn as planned, including notification, and adjust as needed to maintain fire control.

In general, the burning sequence is divided into two parts: establishing firebreaks, and lighting the headfire.

Establishing Firebreaks

Firebreaks are necessary to prevent the fire from escaping. They may be burned or cleared. Burned firebreaks are preferable since cleared or tilled firebreaks on sloping areas tend to erode. Both types are effective if properly prepared. Firebreaks should be twice as wide as the tallest adjoining herbaceous material. A minimum width of six feet is required. Firebreaks may be established in advance or at the time of the burn, as needed. If burned in advance, a firebreak must be relit at the time of the burn.

Burned firebreaks. Burned firebreaks are established along the perimeter of the area, taking advantage of natural barriers such as livestock trails, heavily grazed areas, pasture roads, rock outcrops, stream beds, and other bare areas. When natural barriers are not available, mowing to reduce vegetation height will aid in establishing the firebreak. Completed firebreaks must be wide enough to prevent the headfire from escaping and limit the possibility of burning embers and other material escaping the area.

Firebreaks are prepared by lighting short lengths of vegetation along a natural barrier or mowed area, moving into the wind on the downwind side of the burn area (Figure 2). This fire is allowed to back away from the barrier. Exercise caution to prevent the fire from crossing the barrier. When both sides of the fire are under control, repeat the process on a new length of vegetation.

When preparing firebreaks in advance, modify the above procedure by putting the backing fire out when it has burned at least 6 feet (Figure 3). Preburned breaks must be relit before starting the headfire.

Cleared firebreaks. Cleared firebreaks are bare soil lines prepared mechanically. They should be used only where erosion is not a concern.

Lighting the headfire

Once firebreaks are in place, the headfire can be started. It must be lit as rapidly as possible for the fire to be effective. Under most conditions, the headfire can be lit up to 30 feet downwind from the perimeter. A follow-up crew can put out the resulting backing fire.

Firing Techniques

Two firing techniques are available to accomplish the completion of the burn: strip-head fire and ring fire. Each has a specific purpose and specific requirements.

Strip-head Fire Technique. The strip-head fire technique (Figure 4) requires setting a line or series of lines of fire upwind 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. As the distance from the firebreak increases, the width of the strips can be increased. It is most useful to quickly widen firebreaks and burn areas adjacent to hazards (controls size of fire and amount of smoke). Disadvantages are high heat concentration as the lines come together and the necessity of a well developed firebreak.

Ring Fire Technique. A ring fire (Figure 5) requires a firebreak downwind that provides adequate width to prevent escape of the fire. On level to gently rolling topography, a minimum 150-foot-wide firebreak is adequate at the point where the headfire will have the longest run. Once the firebreak is secure, the remaining sides of the burn area should be lit as rapidly as possible. The resulting headfire will sweep rapidly across the area. As the headfire builds in heat and size, a draft from the

front draws the backing fire of the firebreak into the headfire. A strong convection column develops in the center of the ring. Once this convection column develops, the fires are drawn rapidly to the middle of the burn area, resulting in a fast, hot burn. Ring fires are the safest since once the ring is closed and the perimeter fires are extinguished, little chance remains for the fire to escape. Ring fires should be used where brush control, weed control and mulch removal are reasons for burning.

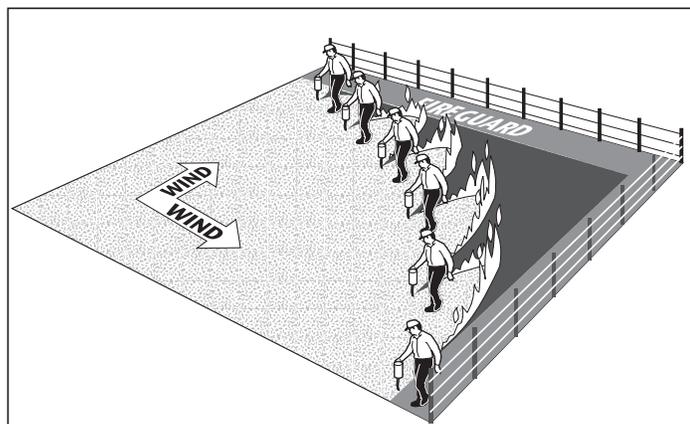


Figure 4. The strip-head fire technique involves lighting one or more fire lines into or perpendicular to the wind direction. The width of the strips depends on fuel type, amount, slope, and uniformity.

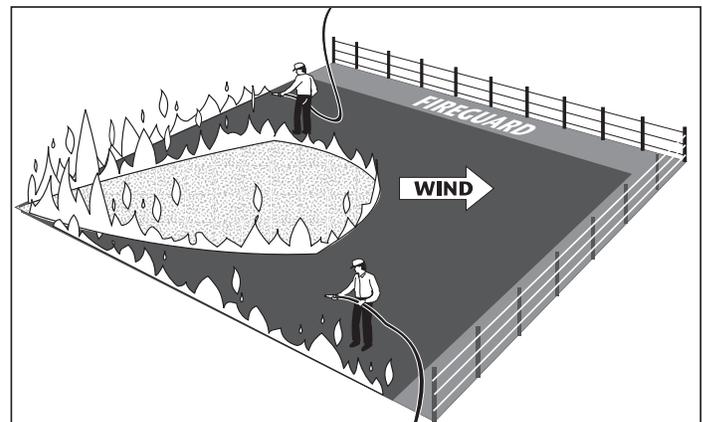
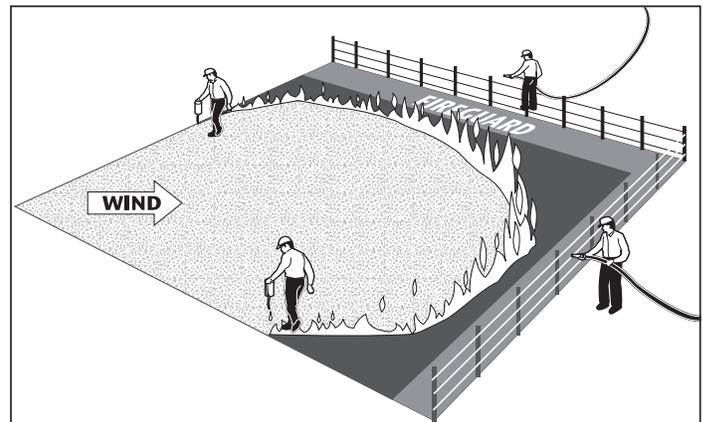
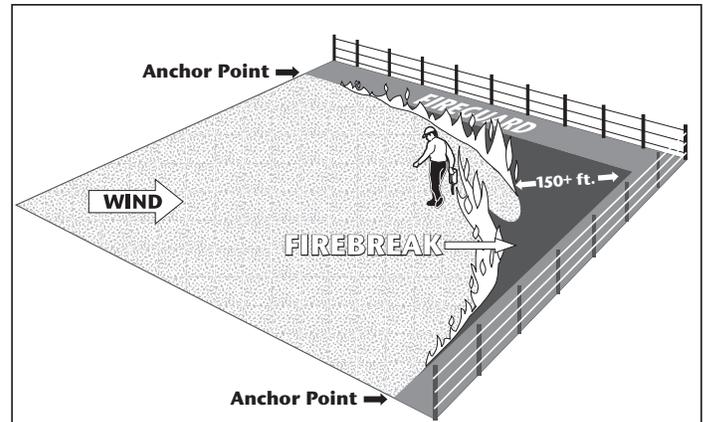


Figure 5. The ring fire technique usually is used for prescribed burning. After the firebreaks are established and burning, the upwind sides are lit as rapidly as possible. The fire then creates its own chimney, resulting in a fast, hot burn.

After the Burn

Once the headfire has burned out, make sure small fires, burning logs, smoldering cow chips, and similar hazards are under control. Also, notify neighbors, fire department, and others. Clean up and repair all equipment.

Mop Up

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 to a safe area. This includes cow chips, logs and dead trees, small areas still burning, and fenceposts. Never bury cow chips as they can hold fire a long time. Water does not always extinguish the embers, but detergent mixed with water will help penetrate the cow chips. Burning logs and dead trees can produce embers that are easily carried by wind to unburned areas. Carefully wet down and break apart or move logs from the edge of the burn. Dead trees that are burning should be cut down and treated the same as logs. Relight small areas of slow-burning grass and allow them to burn out rapidly. Check the perimeter at least twice.

Notification

After the burn and mop up are complete, notify the same list of people and agencies contacted before the burn. This will ensure that help will be summoned immediately if a wildfire or accidental escape occur due to incomplete mop up.

Clean Equipment

After the burn is complete, clean, repair and store all equipment. This prolongs equipment life and ensures that equipment is ready when needed again.

State Regulations

28-19-645. Open burning prohibited.

A person shall not cause or permit the open burning of any wastes, structures, vegetation, or any other materials on any premises except as authorized by K.A.R. 28-19-647 and K.A.R. 28-19-648. (Authorized by K.S.A. 1994 Supp. 65-3005; implementing K.S.A. 1994 Supp. 65-3005, K.S.A. 65-3010; effective March 1, 1996.)

28-19-646. Responsibility for open burning.

It shall be prima facie evidence that the person who owns or controls property on which open burning occurs has caused or permitted the open burning. (Authorized by K.S.A. 1994 Supp. 65-3005; implementing K.S.A. 1994 Supp. 65-3005, K.S.A. 65-3010; effective March 1, 1996.)

28-19-647. Exceptions to prohibition on open burning.

- (a) The following open burning operations shall be exempt from the prohibition on the open burning of any materials imposed by K.A.R. 28-19-645:
- (1) open burning carried out on a residential

- premise containing five or less dwelling units and incidental to the normal habitation of the dwelling units, unless prohibited by any local authority with jurisdiction over the premises;
 - (2) open burning for cooking or ceremonial purposes, on public or private lands regularly used for recreational purposes;
 - (3) open burning for the purpose of crop, range, pasture, wildlife or watershed management in accordance with K.A.R. 28-19-648; or
 - (4) open burning approved by the department pursuant to paragraph (b).
- (b) A person may obtain an approval from the department to conduct an open burning operation that is not otherwise exempt from the prohibition imposed by K.A.R. 28-19-645 if it is demonstrated that the open burning is:
- (1) necessary, which in the case of burning for the purpose of disposal of any materials, shall mean that there is no other practical means of disposal;
 - (2) in the public interest; and
 - (3) is not prohibited by any local government or local fire authority.
- (c) Open burning operations for which an approval is required but which are deemed to be necessary and in the public interest include the following:
- (1) the use of safety flares for disposal of flammable gases;
 - (2) fires related to the training of government or industrial personnel in fire fighting procedures;
 - (3) fires set for the removal of dangerous or hazardous liquid materials;
 - (4) open burning of trees and brush from non-agricultural land clearing operations; and
 - (5) open burning of clean wood waste from construction projects carried out at the construction site.
- (d) Each person seeking an approval to conduct an open burning operation pursuant to this regulation shall submit a written request to the department containing the following information:
- (1) the location of the proposed open burning and the name, address and telephone number of the person responsible for the open burning;
 - (2) a description of the open burning including:
 - (A) the estimated amount and nature of material to be burned;
 - (B) the proposed frequency, duration and schedule of the burning;
 - (C) the size of the area to which the burning will be confined;
 - (D) the method of igniting the material;
 - (E) the location of any public roadways within 1,000 feet of the proposed burn;
 - (F) the number of occupied dwellings within 1,000 feet of the proposed burn; and

- (G) evidence that the open burning has been approved by appropriate fire control authority having jurisdiction over the area; and
- (3) the reason why the proposed open burning is necessary and in the public interest if the activity is not listed in subsection (c) of this regulation.
- (e) Each open burning operation for which the department issues an approval pursuant to paragraph (b) shall be subject to the following conditions, except as provided in paragraph (f):
 - (1) The person conducting the burning shall stockpile the material to be burned, dry it to the extent possible before it is burned, and assure that it is free of matter that will inhibit good combustion.
 - (2) A person shall not burn heavy smoke-producing materials including heavy oils, tires, and tarpaper.
 - (3) A person shall not initiate burning during the nighttime, which for the purposes of this regulation is defined as the period from two hours before sunset until one hour after sunrise. A person shall not add material to a fire after two hours before sunset.
 - (4) A person shall not burn during inclement or foggy conditions or on very cloudy days, which are defined as days with more than 0.7 cloud cover and with a ceiling of less than 2,000 feet.
 - (5) A person shall not burn during periods when surface wind speed is less than 5 mph or more than 15 mph.
 - (6) A person shall not burn within 1,000 feet of any occupied dwelling, unless the occupant of that dwelling has been notified before the burn.
 - (7) A person shall not conduct a burn that creates a traffic or other safety hazard. If burning is to take place within 1,000 feet of a roadway, the person conducting the burn shall notify the highway patrol, sheriff's office, or other appropriate state or local traffic authority before the burning begins. If burning is to take place within one mile of an airport, the person conducting the burn shall notify the airport authority before the burning begins.
 - (8) The person conducting the burn shall insure that the burning is supervised until the fire is extinguished.
 - (9) The department may revoke any approval upon 30 days notice.
 - (10) A person shall conduct an open burning operation under such additional conditions as the department may deem necessary to prevent emissions which:
 - (A) may be injurious to human health, animal or plant life, or property; or
 - (B) may unreasonably interfere with the enjoyment of life or property.
- (f) The department may issue an approval for an open burning operation that does not meet the conditions set forth in subsection (e) upon a clear demonstration that the proposed burning:
 - (1) is necessary and in the public interest;
 - (2) can be conducted in a manner that will not result in emissions which:
 - (A) may be injurious to human health, animal or plant life, or property; or
 - (B) may unreasonably interfere with the enjoyment of life or property; and
 - (3) will be conducted in accordance with such conditions as the department deems necessary.

(Authorized by K.S.A. 1994 Supp. 65-3005; implementing K.S.A. 1994 Supp. 65-3005, K.S.A. 65-3010; effective March 1, 1996.)

28-19-648. Agricultural open burning.

 - (a) Open burning of vegetation such as grass, woody species, crop residue, and other dry plant growth for the purpose of crop, range, pasture, wildlife or watershed management shall be exempt from the prohibition on the open burning of any materials imposed by K.A.R. 28-19-645, provided that the following conditions are met:
 - (1) the person conducting the burn shall notify the local fire control authority with jurisdiction over the area before the burning begins, unless the appropriate local governing body has established a policy that notification is not required;
 - (2) a person shall not conduct a burn that creates a traffic safety hazard. If conditions exist that may result in smoke blowing toward a public roadway, the person conducting the burn shall give adequate notification to the highway patrol, sheriff's office or other appropriate state or local traffic control authorities before burning;
 - (3) a person shall not conduct a burn that creates an airport safety hazard. If smoke may affect visibility at an airport, the person conducting the burn shall give adequate notification to the appropriate airport authorities before burning; and
 - (4) the person conducting the burn shall insure that the burning is supervised until the fire is extinguished.
 - (b) Nothing in this regulation shall restrict the authority of local jurisdictions to adopt more restrictive ordinances or resolutions governing agricultural open burning operations.

(Authorized by K.S.A. 1994 Supp. 65-3005; implementing K.S.A. 1994 Supp. 653005, K.S.A. 65-3010; effective March 1, 1996.)

