Prescribed Fire Weather

Weather Conditions for Conducting Prescribed Burns

Potential fire prescription variation for conducting a prescribed fire:

Temperature: 30 to 110°F

Relative Humidity: 10 to 80 percent

Wind Speed: 4 to 25 mph

Season of Year: Winter, Spring, Summer or Fall

Prescriptions will vary with each burn unit, fire boss and crew experience, equipment, areas surrounding burn unit, firebreak, and fuel type. For more information about prescriptions see Fire Prescriptions for Maintenance and Restoration of Native Plant Communities NREM-2878 at: **http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-2704/NREM-2878web-surv**

General Guidelines

Rule 1. For those in the process of learning to burn or with limited experience, use the 60:40 rule. The 60:40 rule states you burn with a temperature <60F, a relative humidity (RH) >40 percent and a wind speed of 5 to 15 mph measured at six feet above the surface of the ground.

Rule 2. Rule of halves. This rule is used in the field to predict changes in relative humidity and correspond- ing fire behavior. When the air temperature increases by 20°F, the RH will typically decrease by 50 percent. For example, if the temperature changes from 60°F with 40 percent RH to 80°F, the RH will change from 40 percent to 20 percent. A fire that can be conducted safely at 40 percent RH may pose a safety risk at 20 percent.

Rule 3. Do not burn if there is a forecasted frontal passage or wind shift within 12 hours.

Rule 4. If the conditions are not right, including all parts of the prescription (adequate personnel, equipment, weather conditions, etc.), do not start the fire. Wait until everything is right.

Rule 5. If the fire is not going well, put it out. This could be due to spot fires, creep-overs, equipment problems, extreme fire behavior, utilizing too much water, or resources stretched too thin.

Rule 6. Do not leave the fire until it is completely out, which means there is no smoke or embers along the edges of the burn unit.

Spotfires

Spotfires are fires that occur outside the burn unit. They can be caused by crowning eastern redcedar, brush piles on the edge of the burn unit, leaf litter blowing across the firebreak, smoke

or fire whirls, low relative humidity, or improper firebreaks.

Spotfires and Relative Humidity

Spotfires are more prevalent when the relative humidity is below 40 percent.

Spotfire Frequencies by Humidity

Number of spotfires on 99 prescribed burns with the corresponding minimum relative humidity. Of the 21 burns that had spotfires only two occurred when the relative humidity was greater than 40 percent.

Incidence of Spotfires

Percent probability of a spotfire occurring at a given relative humidity.

With knowledge of the probability of spotfire occurring, personnel can determine necessary crew size and equipment. Inexperienced burn bosses should use this data to help reduce risk (liability) and increase safety for their crews. The most important point is to burn when conditions are safest for the crew and surrounding neighbors.

Fire Prescription Planner

The “Fire Prescription Planner” in OK-FIRE (**http://okfire.mesonet.org**) allows the fire manager to specify lower and/ or upper limits for various variables pertain- ing to weather, dispersion conditions, dead fuel moisture, and fire danger. After the prescribed values are entered, the user chooses the Mesonet site closest to the burn unit. Using output based on the latest 84-hour forecast, a table will be produced.

The Planner, as is the case with other OK-FIRE products, is based solely on one particular forecast model (the North American Model or NAM). As with all forecast models, the NAM, while a good model, is never perfect and users are strongly encouraged to check the official National Weather Service (NWS) forecasts for any discrepancies with the NAM. To get an hour-by-hour NWS forecast, click on the “National Weather Service” link in the Weather/Forecasts section of the OK-FIRE web site. Once on the home page of the particular weather forecast office (WFO), click on the geographical point of interest. On the result- ing page that appears, scroll down to the bottom and select “Hourly Weather Graph” or “Tabular Forecast” to get an hourly forecast in either graphical or tabular format, respectively.

Screenshot of OK-FIRE Website

Fire Prescription Planner from the OK-FIRE Web site. This allows fire managers to specify various weather variables and determine burn conditions up to 84 hours in advance.

Weather Sources

- OK-FIRE (**http://okfire.mesonet.org**)
- Oklahoma Agweather (**http://agweather.mesonet.org**)
- National Weather Service Fire Weather Forecasts (**http://www.weather.gov**)
- National Weather Service Fire Weather Forecasts (**http://www.srh.noaa.gov/ridge2/fire/**)
- Weather Underground (**http://www.wunderground.com**)
- Intellicast (**http://www.intellicast.com**)
- AccuWeather (**http://www.accuweather.com**)
- Weather Channel (**http://www.weather.com**)

Burn Days

Weather constraints limit the number of days pre- scribed fires can be safely conducted. We have determined there about 222 days per year in which prescribed burns can be safely conducted (from Oklahoma Mesonet at a site in north central Oklahoma). December through April is the worst time of the year to conduct prescribed fires due to variable weather conditions and burn bans. July through September is the best period to conduct burns due to stable weather patterns and conditions. The data also shows that there are more hours per day available to burn during July to September, than December to April. Wind direction is also a concern regarding timing of burns. For more opportunities to conduct prescribed burns fire managers should consider burning in different seasons of the year. For more information about burning all year see The Best Time of Year to Conduct Prescribed Burns NREM-2885 at: **http://pods.dasnr. okstate.edu/docushare/dsweb/Get/Document-7504/NREM-2885web.pdf** and Burning in the Growing Season E-1025 at: **http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-7629/E-1025%20Burning%20in%20the%20Growing%20Season.pdf**

Burn Days by Month Graph

The average number of burn days per month using the following weather parameters: temperature between 30 F to 110 F, relative humidity of 25 to 80 percent, wind speeds at 4 to 15 mph, no precipitation during the time period, and there must be a minimum of a three-hour consecutive block of these conditions for that day to be considered a burn day.

Burn Hours per Month Graph

The average number of burnable hours per day by month using the same weather parameters as above.

Wind Direction by Days Graph

The average number of burnable days by wind direction per year using the same weather parameters as listed above.

Burning Brush Piles

Building a Brushpile

There may be a need to doze or cut eastern redcedar around the boundary of the burn unit. This will make the burn safer. Keep the piles small and push them at least 300 feet into the burn unit.

Burning a Brushpile

The best time to burn brush piles is in May and June when the grass is green. Exercise care when burning piles in areas that have been ungrazed or lightly grazed.

As a general rule, eastern redcedar trees and brush should never be cut, dozed, or piled prior to a prescribed burn. This will only complicate the burn and increase the chance of an escaped fire. Brush piles can cause spotfires up to 500 feet downwind. However, you may need to doze or cut trees around the boundary of the burn unit to prevent spotfires. This will make the burn safer, but be sure to push and spread the brush into the burn unit. If piling is absolutely necessary, then push the piles 300 feet into the burn unit and keep the piles small. There also are some economic benefits to not cutting down eastern redcedar until after you burn. If you burn first, the fire should kill many of the eastern red- cedar depending upon tree height and fuel load. You can then remove only the eastern redcedar trees that did not burn or brown out. This will reduce costs. The best time to burn brush piles is after the prescribed fire when fuels are low. We have found the safest time to burn brush piles is in May and June. During this time, most vegetation is green and will not burn well. Care should be exercised when burning brush piles in areas that have been ungrazed or lightly grazed. Have suppression equipment available on site anytime you burn. Remember brush piles can smolder for many days so keep track of the weather.