OK-FIRE Basics for *FIRE DANGER*
(http://okfire.mesonet.org)

Fire Weather Variables:

Relative Humidity:	**35-85%**	Increasing fire danger as relative humidity decreases
	20-35%	Containment becomes difficult; quick ignition; spot fires increase
	< 20%	Extreme fire behavior; spot fires frequent
Wind Speed:	**> 20 mph**	Higher speeds cause increased fire danger and spread rates; winds and gusts over 20 mph become increasingly problematic
Temperature:		In general, higher temperatures increase fire danger, but relative humidity and wind speed are by far the most important factors among the weather variables

Relative humidity (RH) is the most important of the three weather variables above, since if RH is sufficiently high, the moisture content of the 1-hour and 10-hour dead fuels (see below) will be high enough to impede or exclude burning even with high wind speeds. Given sufficiently low RH, the second most important weather variable then becomes wind speed.

However, ***even with suitable fire weather, the existence and levels of fire danger depend on the FUEL COMPLEX*** ... its greenness level (which is also reflective of the amount of live to dead fuel), live fuel moisture levels, and type/amount of fuels. One can have low RH and high wind speed, but if most of the surface fuels are green, there will be minimal fire danger. A general equation for fire danger is:

Suitable Fire Weather + Sufficient Dead Fuel = Increased Fire Danger Levels

Dead Fuel Moisture:

A variable which is directly related to dead fuel is "dead fuel moisture" (DFM). In particular, 1-hour dead fuels (fine fuels like dead grasses and leaves) are critical, followed by 10-hour fuels (about ½" diameter). OK-FIRE has many products relating to 1-h and 10-h dead fuel moisture.

1-h and 10-h Dead Fuel Moisture:	**7-20%**	Increasing fire danger as dead fuel moisture values decrease
	5-7%	Containment becomes difficult; quick ignition; spot fires increase
	< 5%	Extreme fire behavior; spot fires frequent

Again, one needs to check the greenness levels of the native surface fuels, as one can have very low 1-h and 10-h DFM, and yet have minimal fire danger if most of the fuels are green.

There is no substitute for knowing the greenness levels of the native surface fuels in your area.

Fire Danger Variables:

The most important of the fire danger indices produced by the Oklahoma Fire Danger Model is **Burning Index** (BI), which relates to the intensity of the headfire and its flame length. Besides being a function of weather and dead fuel moisture, BI is also strongly influenced by the type, amount, and greenness levels of the native surface fuels being modeled. ***Thus, the FUEL complex and GREENNESS level must be appropriate for the fire model to produce reasonable results.***

Greenness Level + Fuel Model + Weather ➡ Fire Danger Level

The **weekly greenness level** assigned a given Mesonet station by the satellite can be found by looking at the "Relative Greenness Map" in the FIRE section and zooming into your geographical area of interest. It is important that you ***look at surrounding Mesonet sites in your area and select a site which has a relative greenness value closest to the observed levels of greenness of your native fuels at the surface.*** Else, if you're in an agricultural area, the Mesonet station's greenness level may be more reflective of the crops or barren fields, rather than the native fuels which are the focus of the fire danger predictions.

Each 1-km square of Oklahoma is modeled by one of five "**fuel models**", ranging from shortgrass prairie to forest fuel models, each of which describes the type and amount of surface fuels available for burning (FIRE, Default Fuel Models Map). These "default" fuel models are used for all the fire danger map products in OK-FIRE. The five fuel models are: A (annual grasses), L (perennial grasses), T (tallgrass with brush), R (hardwood forest), and P (pine forest).

For chart, table, or data box products, the user has the ***ability to select a different fuel model*** (10 models are available) for a given Mesonet station if the default model is deemed inappropriate (FIRE, Station Fuel Model Options). The fuel model currently being used by the fire danger model for that station is called the "current" fuel model, while the default model is called the "default" fuel model. The "current" fuel model can be changed; the "default model" stays the same.

Of the five fuel models listed above, Model T is a reliable fuel model to use for "worst-case" fire danger in most sections of Oklahoma, so you may wish to use that model for your daily fire danger assessment and forecasts. However, if you wish to model just grasses, you can use Model L; or, if you're in forest settings, you can use Model R (hardwood forest) or Model P (pine forest). Other fuel models are available as well; however, we recommend using caution with Models D and N, as they tend to overpredict fire danger, especially in more humid conditions, and were not developed for Oklahoma fuels.

A general interpretation of fire danger based on Burning Index is as follows:

Burning Index (BI)	Fire Danger
< 20	LOW
20-40	MODERATE
40-80	HIGH
80-110	SEVERE
> 110	EXTREME

However, based on your experience with local wildfires, you may want to "recalibrate" these BI ranges to more accurately reflect levels of fire danger for your area and fuel type.

Burning Index will, on most days, go through a daily cycle, with highest values during the daytime and lower values at night, so during the "fire season" there typically will be a few hours of appreciable fire danger each day. ***What is important to watch for are the relative LEVELS of fire danger (higher BI values) and the DURATION of those high values (sometimes persisting through the night). Also, with respect to the 84-h forecast, the TREND in BI is important and valid, even with inexact BI values.*** For example, if fire danger is predicted to be highest on Saturday, it will be - regardless of fuel model or greenness levels.