How To Read the Fuel Moisture Table

WDY FM = moisture level percent in live woody fuels (trees). Note that during spring green-up, values of 300 are to be expected, while during the mature summer phase, 100 indicates healthy trees. High fire behavior can be expected for values < 125, moderate for values between 125 and 150, etc.
HRB FM = moisture level percent in live herbaceous fuels.
1 H FM = moisture level percent in the dead "one hour fuels": grasses, downed pine needles, twigs of <1/4 inch. These fuels can change moisture levels dramatically within one hour, depending on conditions. Percent is determined by comparison to a fully dried weight.
10 FM = moisture level percent in the 10 hour fuels. Small sticks between ¼ inch and 1 inch diameter.
HU FM = moisture level in the 100 hour fuels, between 1 and 3 inches diameter.
TH FM = moisture level in the 1000 hour fuels, greater than 3 inches diameter. Most commonly related to overall fire danger. Fire season is TH FM < 14.
XH FM = moisture level in the 10,000 hour fuels? Must be big stuff.

Other Table Elements
From the National Fire Danger Rating System (NFDRS)

Ignition Component (IC) - The Ignition Component is a number which relates the probability that a fire will result if a firebrand is introduced into a fine fuel complex. The ignition component can range from 0 when conditions are cool and damp, to 100 on days when the weather is dry and windy. Theoretically, on a day when the ignition component registers a 60 approximately 60% of all fire brands that come into contact with wildland fuels will require suppression action.

Ignition normally takes place in the dead component of the fine fuels. Three distinct steps must be considered in this ignition process. They are 1) a firebrand must come into contact with the dead fuel, 2) the fuel particle must be dry, and 3) the temperature of the fuel particle must be raised to the kindling point which is about 380 degrees centigrade. Living material in the fine fuel complex reduces the efficiency of ignition. Therefore, an adjustment to the ignition component is made based on the percentage of live fuel (herbaceous vegetation) in the fine fuel complex.
The moisture content of the dead component of the fine fuel (1-hr. timelag fuel moisture) is determined by the state of the weather (sunny or cloudy), air temperature, and relative humidity at the time of the 2 p.m. fire weather observation.
The condition of the herbaceous (live) vegetation and the 1-hr. timelag fuel moisture are then integrated in the calculation the fine fuel moisture (FFM) which expresses the effective moisture content of the fine fuels.
The closer the initial temperature of the fuel is to the ignition temperature, the more likely a fire will result when a firebrand in introduced into the fine fuel complex, since not a much energy is required to raise the fuel particle to its ignition temperature.

Spread Component (SC) - The Spread Component is a numerical value derived from a mathematical model that integrates the effects of wind and slope with fuel bed and fuel particle properties to compute the forward rate of spread at the head of the fire. Output is in units of feet per minute. A Spread Component of 31 indicates a worst-case, forward rate of spread of approximately 31 feet per minute.
The inputs required to calculate the SC are wind speed, slope, fine fuel moisture (including the effects of green herbaceous plants), and the moisture content of the foliage and twigs of living, woody plants.
Since the characteristics through which the fire is burning are so basic in determining the forward rate of spread of the fire front, a unique SC table is required for each fuel type.

Energy Release Component (ERC) - The Energy Release Component is defined as the potential available energy per square foot of flaming fire at the head of the fire and is expressed in units of BTUs per square foot. Like the Spread Component, the Energy Release Component is calculated using tables unique to each fuel model.
The rate of combustion is almost totally dependent on the same fuel properties as are considered in the SC calculation. However, the principal difference in the calculation of the two components is that SC is determined primarily by the finer fuels, whereas ERC calculations require moisture inputs for the entire fuel complex, i.e., 1-hr. , 10-hr. , 100-hr. , 1000-hr. , and the live fuel moisture.
The day to day variations of the ERC are caused by changes in the moisture contents of the various fuel classes, including the 1000 hour time lag class. The number is related to the fuel model so a guideline for low medium high cant be standardized.
ERC is derived from predictions of the rate of heat release per unit area during flaming combustion and the duration of the burning. Expressed in BTU's per square foot.

Burning Index (BI) - A measure of fire intensity. A number relating to the potential amount of effort needed to contain a single fire in a particular fuel type within a rating area. BI combines the Spread Component and Energy Release Component to relate to the contribution of fire behavior to the effort of containing a fire. BI has no units, but in general it is 10 times the flame length of a fire.

Fire Load Index (FL) - A rating of the maximum effort required to contain all probable fires occurring within a rating area during the rating period. It is the cumulative index of the NFDRS. It is designed to combine the projections of fire occurrence and behavior into a single number that can be related to the total fire suppression job. A number relating the total amount of effort required to contain all probable fires within the rating area during a specified period of time. The difficulty of containing a single fire as indicated by the Burning Index (BI), multiplied by the probable number of fires projected by the Occurrence Index (OI), gives a measure of the potential fire containment effort on the protection unit for the day. Like the Burning Index, a unique Fire Load Index table is required for each fuel model. The meaning of FL has been left to the user. By itself, it does not tell the user much about the nature of the fire management problem. One needs to examine the individual components and indices that are the basis for the FL. It ranges over a scale of 1-100 and has no units.

Haines Index - A national fire-weather index based on the stability and moisture content of the lower atmosphere and their direct relationship to the growth of large fires. The index is from 1-6 with 1 being the lowest potential for large plume-doominated fires, while 6 is the highest potential for plume-dominated fires.

Keetch-Byram Drought Index (KBDI). A soil/duff drought index that ranges from 0 (no drought) to 800 (extreme drought) and is based on a soil capacity of 8 inches of water. Factors in the index are maximum daily temperature, daily precipitation, antecedent precipitation, and annual precipitation.

KBDI = 0 - 200: Soil moisture and large class fuel moistures are high and do not contribute much to fire intensity. Typical of spring dormant season following winter precipitation.
KBDI = 200 -400: Typical of late spring, early growing season. Lower litter and duff layers are drying and beginning to contribute to fire intensity.
KBDI = 400 - 600: Typical of late summer, early fall. Lower litter and duff layers actively contribute to fire intensity and will burn actively.
KBDI = 600 - 800: Often associated with more severe drought with increased wildfire occurrence. Intense, deep burning fires with significant downwind spotting can be expected. Live fuels can also be expected to burn actively at these levels.

Example Fire Danger Output (based on the fire weather observations listed above)

ST NME	STAT'N	DATE	HR	T	MSGC	WS	WDY	HRB	1H	10	HU	TH	IC	SC	EC	BI	FL	SL	R	KBDI
Zone: 659																				
KOSMOS	451105	081197	13	O	7G4P3	5	142	136	5	6	15	15	26	8	31	37	27	3-	M	57
LONGMI	451106	081197	13	O	7G2P3	6	129	125	5	4	16	17	20	5	33	31	22	3	M	57
HAGAR	451115	081197	12	O	7G3P3	6	138	93	7	8	15	18	20	7	30	34	24	3-	M	57
OHANAP	451119	081197	13	O	7G2P3	10	146	155	4	6	17	19	31	7	28	35	25	3	M	93
LESTER	451705	081197	13	O	7G3P3	8	143	135	4	6	16	19	31	8	29	36	26	3-	M	569
STAMPE	451711	081197	13	O	7G3P2	6	134	122	5	7	14	17	10	6	33	35	25	2	L	41
GREENW	451718	081197	13	O	7G4P3	10	142	147	5	7	16	19	35	11	28	42	31	3-	M	50
ORRCR	451919	081197	13	O	7G3P3	6	127	5	5	7	15	17	32	9	35	43	31	3+	M	100

The list below contains explanations of the individual data elements listed above.

ST NME Station name

STAT'N - Station catalog number

DATE Today's date

HR Hour of the observation. Note.....this should match the time listed on the fire weather observation.

T Type (O) observed (F) forecast.

MSGC - M=Fuel Model...7G = 1978 NFDRS fuel models, 8G = 1988 NFDRS fuel models), (**S**=Slope...1 = 0-25%, 2 = 26-40%, 3 = 41-55%, 4 = 56-75%, 5 = >75%), (**G**=Grass type... P = perennials A = annuals), (**C**=Climate class... 1= arid, 2 = semiarid, 3 = subhumid , 4 = humid).

WS - Observed wind speed (miles/hour).

WDY - Woody fuel moisture (%).

HRB - Herbaceous fuel moisture (%).

1H - One hour timelag fuel moisture (%).

10 - Ten hour timelag fuel moisture (%).

HU - One hundred hour timelag fuel moisture (%).

TH - One thousand hour timelag fuel moisture (%).

IC - Ignition Component - the probability of ignition expressed as a unitless number. (0-100)

SC - Spread Component - the forward rate of spread of the flaming fire front at the head of the fire. (ft/min)

EC - Energy Release Component - the amount of heat energy per square foot within the flaming fire front. (BTUs per square foot)

BI - Burning Index - a dimensionless number that relates the contribution of fire behavior to the effort of containing a single fire.

FL - Fire Load Index - the total potential containment effort needed on a given day expressed as a dimensionless number. (0 - 100)

SL - Staffing Level. (1 - 5)

R - Adjective Rating

KBDI - Keetch Byram Drought Index. (0 - 800)