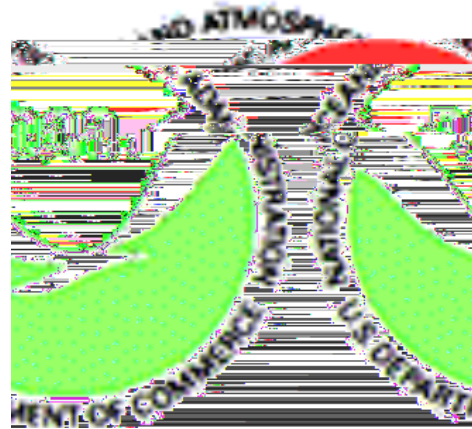


2024 Fire Weather Operating Plan for Kentucky



NWS Charleston, WV

NWS Jackson, KY

NWS Louisville, KY

NWS Paducah, KY

NWS Wilmington, OH

This operating plan will be a semi-permanent document, specifying Fire Weather services provided by National Weather Service serving the region noted above. The plan incorporates procedures detailed in the Interagency Agreement for Meteorological Services.

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I. Introduction

Purpose of the AOP

This Fire Weather Services Operating Plan serves as the official document governing the interaction and relationships between the National Weather Service (NWS) offices, and the federal, state, and local natural resource and land management agencies or cooperators in Kentucky. This document compliments and further defines for the area named above what is contained in the National Interagency Agreement for Meteorological Services and the National Memorandum of Understanding (MOU).

This Operating Plan is issued in lieu of a formal Memorandum of Understanding (MOU) between the National Weather Service Offices, federal, state, and other agencies that rely on fire weather support. The plan outlines forecast operations and services available to users. This includes products and formats, dissemination and coordination, and the responsibilities of the partners.

This Operating Plan will be the governing document for fire weather procedures and cooperation among the following agencies:

KY Department of Fish and Wildlife Resources
KY Division of Forestry
NOAA National Weather Service Forecast Offices
Office of Kentucky Nature Preserves
USDA Forest Service
USDI National Park Service
U.S. Fish and Wildlife Service
U.S Department of Defense
The Nature Conservancy

II. New for 2024

Changes have been made to reflect staffing changes, transfers, and departures for several agencies. An updated Spot Forecast page is now operational, <https://spot.weather.gov/>. Instructions for requesting a spot forecast have been updated accordingly.

III. Service Area/NWS Organizational Directory

A. Service Area

The service area covered by this AOP is the Commonwealth of Kentucky, which are served by the National Weather Service Offices (WFOs) in Charleston, WV (RLX), Jackson, KY (JKL), Louisville, KY (LMK), Paducah, KY (PAH), and Wilmington, OH (ILN). A map of counties served by each WFO can be found in Appendix E.

The (Charleston, WV) **RLX forecast area** includes portions of extreme northeastern Kentucky. The Kentucky counties served by WFO RLX include:

<u>County</u>	<u>Zone #</u>	<u>County</u>	<u>Zone #</u>
Boyd	KYZ103	Greenup	KYZ101
Carter	KYZ102	Lawrence	KYZ105

The (Wilmington, OH) **ILN forecast area** includes portions of north-central and northeastern Kentucky.

The Kentucky Counties served by WFO ILN include:

<u>County</u>	<u>Zone #</u>	<u>County</u>	<u>Zone #</u>
Boone	KYZ091	Kenton	KYZ092
Bracken	KYZ097	Lewis	KYZ100
Campbell	KYZ093	Mason	KYZ099
Carroll	KYZ089	Owen	KYZ094
Gallatin	KYZ090	Pendleton	KYZ096
Grant	KYZ095	Robertson	KYZ098

The (Jackson, KY) **JKL forecast area** includes portions of eastern and south central KY

The Kentucky Counties served by WFO JKL include:

<u>County</u>	<u>Zone #</u>	<u>County</u>	<u>Zone #</u>
Bath	KYZ051	Magoffin	KYZ109
Bell	KYZ087	Martin	KYZ119
Breathitt	KYZ112	McCreary	KYZ084
Clay	KYZ116	Menifee	KYZ060
Elliott	KYZ104	Montgomery	KYZ050
Estill	KYZ058	Morgan	KYZ106
Fleming	KYZ044	Owsley	KYZ114
Floyd	KYZ110	Perry	KYZ115
Harlan	KYZ088	Pike	KYZ120
Jackson	KYZ069	Powell	KYZ059
Johnson	KYZ107	Pulaski	KYZ079
Knott	KYZ113	Rockcastle	KYZ068
Knox	KYZ086	Rowan	KYZ05
Laurel	KYZ080	Wayne	KYZ083
Lee	KYZ111	Whitley	KYZ085
Leslie	KYZ117	Wolfe	KYZ108
Letcher	KYZ118		

The (Louisville, KY) **LMK forecast area** includes portions of central KY.

The Kentucky Counties served by WFO LMK (Louisville, KY) include:

<u>County</u>	<u>Zone #</u>	<u>County</u>	<u>Zone #</u>
Adair	KYZ077	Jessamine	KYZ048
Allen	KYZ073	Larue	KYZ053
Anderson	KYZ039	Lincoln	KYZ067
Barren	KYZ074	Logan	KYZ070
Bourbon	KYZ042	Mercer	KYZ047
Boyle	KYZ055	Metcalfe	KYZ076
Breckinridge	KYZ024	Madison	KYZ057
Bullitt	KYZ029	Marion	KYZ054
Butler	KYZ061	Meade	KYZ025
Casey	KYZ066	Monroe	KYZ07
Clark	KYZ049	Nelson	KYZ045
Clinton	KYZ082	Nicholas	KYZ043
Cumberland	KYZ081	Ohio	KYZ026
Edmonson	KYZ062	Oldham	KYZ031
Fayette	KYZ041	Russell	KYZ078
Franklin	KYZ035	Scott	KYZ036
Garrard	KYZ056	Shelby	KYZ034
Grayson	KYZ027	Simpson	KYZ072
Green	KYZ064	Spencer	KYZ038
Hancock	KYZ023	Taylor	KYZ065
Hardin	KYZ028	Trimble	KYZ032
Harrison	KYZ037	Warren	KYZ071
Hart	KYZ063	Washington	KYZ046
Henry	KYZ033	Woodford	KYZ040
Jefferson	KYZ030		

The (Paducah, KY) **PAH forecast area** includes portions of central and western Kentucky.

The Kentucky counties served by WFO PAH include:

<u>County</u>	<u>Zone #</u>	<u>County</u>	<u>Zone #</u>
Ballard	KYZ004	Hopkins	KYZ016
Caldwell	KYZ013	Livingston	KYZ007
Calloway	KYZ009	Lyon	KYZ011
Carlisle	KYZ003	Marshall	KYZ008
Christian	KYZ017	McCracken	KYZ005
Crittenden	KYZ010	McLean	KYZ020
Daviess	KYZ019	Muhlenberg	KYZ021
Fulton	KYZ001	Todd	KYZ022
Graves	KYZ006	Trigg	KYZ012
Henderson	KYZ018	Union	KYZ014
Hickman	KYZ002	Webster	KYZ015

B. National Weather Service Headquarters

NWS Headquarters, located in Silver Spring, Maryland, establishes policies and coordinates the national fire weather program. The national program manager coordinates the program with the regional program managers. The national program manager also works with the national headquarters of the USDA Forest Service, the U.S. Department of Interior's natural resource management agencies, and the National Association of State Foresters in determining overall requirements for meteorological support. The national program manager coordinates national training in forestry and fire weather for NWS forecasters.

C. National Weather Service Regional Headquarters

Regional Headquarters manage the technical operational aspects of the fire weather program within each region. They also provide guidance and assistance to meteorologists-in-charge (MIC) on program operations and developing issues through Supplements to the National Directives System (NDS) and conferences. Regional Headquarters advise National Headquarters on matters pertaining to technical planning and operations. The regional program managers coordinate the regions' fire weather programs and advise the Regional Directors on the operational and administrative aspects of the regions' programs.

D. Weather Forecast Offices (WFO)

Weather Forecast Offices prepare and disseminate forecast products for all sectors of the population, including those for the Fire Weather program. These offices are responsible for providing forecasts for user agencies within their County Warning Area (CWA). Most offices have a designated fire weather focal point or fire weather program leader. The National Weather Service Weather Forecast Offices will provide 24-hour, 365 days a year service. The NWS WFO's can be reached at the contact numbers in section E starting on page 9.

1. Meteorologists-in-Charge (MIC)

The Meteorologist-in-Charge is responsible for the provision of adequate weather services for the office's assigned areas of program responsibility. The MIC will ensure that the focal points or program leaders are provided adequate time for user liaison and assistance activities. MICs can be reached via email or through contact with their respective office.

2. Fire Weather Program Leaders (or Focal Points)

Fire Weather Program Leaders (FWPLS) or focal points are the "customer service representatives" for the program. The focal points or program leaders, as representatives of the MIC's, are in regular contact with the partner agencies, helping them assess their meteorological needs, informing them of NWS products and services available to meet these needs, and educating them in the most effective use of the various NWS products and resources, including NOAA

Weather Radio (NWR). Focal points and program leaders will work with users to utilize existing NWS products and services produced for other programs that could meet the requirements of natural resource management. The focal points and program leaders are also tasked with ensuring staff meteorologists are trained and remain proficient in preparing forecast products for support of the fire weather program. Fire Weather Program Leaders can be reached via e-mail or through contact with their respective office.

E. National Weather Service Forecast Offices and Contact Numbers

National Weather Service Charleston

1754 Hendrickson Drive
South Charleston, WV 25303

Phone:

304-356-5885

Online:

<https://www.weather.gov/rlx/fireweather> (Fire Weather Page)

<https://spot.weather.gov/> (Spot Requests)

<https://forecast.weather.gov/wxplanner.php?site=rlx> (Weather Activity Planner)

FWPL: Simone Lewis (Simone.Lewis@noaa.gov)

Meteorologist in Charge (MIC): Jamie Bielinski (Jamie.Bielinski@noaa.gov)

Primary Backup Office:

NWS Pittsburgh (PBZ)

FWPL: David Shallenberger (IMET)

(david.shallenberger@noaa.gov)

MIC: Jeff Craven (jeffrey.craven@noaa.gov)

Phone: 412-262-2170

Secondary Backup Office:

NWS Jackson, KY (JKL)

FWPL: Jon Pelton (Jonathan.Pelton@noaa.gov)

Assistant FWPL: Philomon Geertson

(philomon.geertson@noaa.gov)

MIC: Vacant

Phone: 606-666-8000

National Weather Service Office Jackson

1329 Airport Rd.
Jackson, KY 41339

Phone:

606-666-8000

Online:

<https://www.weather.gov/jkl/fire> (Fire Weather Page)

<https://spot.weather.gov/> (Spot Requests)

<https://forecast.weather.gov/wxplanner.php?site=ijkl> (Weather Activity Planner)

FWPL: Jon Pelton (IMET) (Jonathan.Pelton@noaa.gov)

Assistant FWPL: Philomon Geertson (philomon.geertson@noaa.gov)

Additional IMET: Christian Cassell (IMET) (christian.cassell@noaa.gov)

Meteorologist in Charge (MIC): Vacant

Primary Backup Office:

NWS Wilmington, OH (ILN)

FWPL: John J. Franks (IMET)

(john.j.franks@noaa.gov)

MIC:

Tom Johnstone (thomas.johnstone@noaa.gov)

Phone: 937-383-0031

Secondary Backup Office:

NWS Charleston, WV (RLX)

FWPL:

Simone Lewis (Simone.Lewis@noaa.gov)

MIC:

Jamie Bielinski (Jamie.Bielinski@noaa.gov)

Phone: 304-356-5885

National Weather Service, Louisville

6201 Theiler Lane

Louisville, KY 40229

Phone:

502-969-8842

Online:

<https://www.weather.gov/lmk/fire> (Fire Weather Page)

<https://spot.weather.gov/> (Spot Requests)

<https://forecast.weather.gov/wxplanner.php?site=lmk> (Weather Activity Planner)

FWPL: Ron Steve (ronald.steve@noaa.gov)

Assistant FWPL: Brian Neudorff (brian.neudorff@noaa.gov)

Meteorologist in Charge (MIC): John Gordon (john.gordon@noaa.gov)

Primary Backup Office:

NWS Paducah (PAH)

FWPL:

Dan Spaeth (daniel.spaeth@noaa.gov)

Assistant FWPL:

Keith Cooley (keith.cooley@noaa.gov)

MIC: Steve Eddy (steven.eddy@noaa.gov)

Phone: 270-744-6440

Secondary Backup Office: NWS Indianapolis, IN (IND)
FWPL:
Michael Koch (michael.koch@noaa.gov)
MIC:
Vacant
Phone: 317-856-0664

National Weather Service, Paducah

8250 Kentucky Highway 3520
West Paducah, KY 42086

Phone:
270-744-6440

Online:

<https://www.weather.gov/pah/fire> (Fire Weather Page)
<https://spot.weather.gov/> (Spot Requests)
<https://forecast.weather.gov/wxplanner.php?site=pah> (Weather Activity Planner)

FWPL: Dan Spaeth (daniel.spaeth@noaa.gov)
Assistant FWPL: Keith Cooley (keith.cooley@noaa.gov)
Meteorologist in Charge (MIC): Steve Eddy (steven.eddy@noaa.gov)

Primary Backup Office: NWS Louisville, KY (PAH)
FWPL:
Ron Steve (ronald.steve@noaa.gov)
Assistant FWPL: Brian Neudorff
(brian.neudorff@noaa.gov)
MIC:
John Gordon (john.gordon@noaa.gov)
Phone: 502-969-8842

Secondary Backup Office: NWS Springfield, MO (SGF)
FWPL:
Gene Hatch (gene.hatch@noaa.gov)
MIC:
Kelsey Angle (kelsey.angle@noaa.gov)
Phone: 417-863-8028

National Weather Service, Wilmington

1901 South State Route 134
Wilmington, OH 45177

Phone:

937-383-0031

Online:

<https://www.weather.gov/iln/fireweather> (Fire Weather Page)

<https://spot.weather.gov/> (Spot Requests)

<https://forecast.weather.gov/wxplanner.php?site=iln> (Weather Activity Planner)

FWPL: John Franks (IMET) (john.j.franks@noaa.gov)

Meteorologist in Charge (MIC): Tom Johnstone (thomas.johnstone@noaa.gov)

Primary Backup Office: NWS Jackson, KY (JKL)
FWPL: Jon Pelton (Jonathan.Pelton@noaa.gov)
Assistant FWPL: Philomon Geertson (IMET Trainee) (philomon.geertson@noaa.gov)
MIC: Vacant
Phone: 606-666-8000

Secondary Backup Office: NWS Cleveland, OH (CLE)
FWPL:
Doug Kahn (douglas.kahn@noaa.gov)
MIC: Gary Garnett (gary.garnett@noaa.gov)
Phone: 216-416-2900

IV. KY Interagency Coordination Center/Primary State Contact

Kentucky Interagency Coordination Center

Daniel Boone NF Supervisor's Office

1700 Bypass Road

Winchester, KY 40391

Center Manager: Nathan White

Assistant Center Manager: Robin Acciaro

Phone: 859-745-3171 or 3172

Online:

<https://gacc.nifc.gov/sacc/dc/kykic/>

V. Southern Area Geographic Coordination Center

Southern Area Coordination Center

1200 Ashwood Parkway, Suite 230,

Atlanta, GA 30338

Meteorologists:

Andy Snyder (NPS)

Steven Ippoliti (FWS)

Phone: 678-320-3000

Online: <https://gacc.nifc.gov/sacc/#>

VI. Services Provided by the National Weather Service (NWS)

A. Fire Weather Seasons

Specific dates for starting and ending routine services will be determined through coordination with the various user agencies and the individual National Weather Service offices.

Wildfires can occur in the Commonwealth of Kentucky as well as the Middle Mississippi Valley and Lower Ohio Valley regions at any time of the year. As a result, most offices issue the fire weather planning forecast at least once a day year-round. However, there are two distinct peaks for fire activity: The first running from late winter into the spring and again during most of the fall.

The **Commonwealth of Kentucky** and the **Daniel Boone National Forest** define the forest fire hazard seasons as follows: **February 15 through April 30 and October 1 through December 15**. Other land management agencies around the region define the fire hazard seasons similarly. These dates may be changed depending on the severity of the fire season and the needs of the users per coordination. Normally, the land management agencies will notify the NWS office(s) of any extension(s) to the fire weather season(s) that they require.

B. Basic Services

1. Fire Weather Planning Forecast (FWF)

a. Issuance Time:

This forecast in tabular format will be issued daily by all offices between about 400 AM and 700 AM Local Time and also around 330 PM Local Time each afternoon during the Spring and Fall Fire Seasons. The FWF will be updated as necessary between these issuance times.

Fire Weather Planning Forecasts will be updated when a Fire Weather Watch or Red Flag Warning is issued or cancelled or when forecast elements are deemed unrepresentative.

Some offices differ in FWF issuance frequency outside the fire seasons. Below is a table summarizing when the FWF is issued by each WFO:

WFO	Frequency During the Fire Season (s)	Frequency During the Rest of the Year
Charleston, WV	8 times per day	8 times per day
Jackson, KY	Twice daily	Once in the AM and updated as necessary

WFO	Frequency During the Fire Season (s)	Frequency During the Rest of the Year
Louisville, KY	Twice daily	Once in the AM and updated as necessary
Paducah, KY	Twice daily	Twice daily
Wilmington, OH	Twice daily	Once in the AM and updated as necessary

b. Viewing the Forecast

Forecasts are available through the Weather Information Management System (WIMS) and online at the websites listed earlier in this document.

Graphical fire weather forecast images are posted at:

<https://www.weather.gov/forecasts/graphical/sectors/centmissvlyFireDay.php#tabs> (Western Part of the Region)

<https://www.weather.gov/forecasts/graphical/sectors/midatlanticFireDay.php#tabs> (Eastern Part of the Region)

Or view digital.weather.gov at the following link centered on the region:

<https://digital.weather.gov/?zoom=7&lat=37.5698&lon=-85.9527&layers=00BTFFTT®ion=0&element=0&mxmz=false>

c. Content/Format:

The FWF product is issued by individual county zones or by county groupings based on climatology, land management areas, or the ongoing or expected weather conditions.

The Morning issuance will contain the next three periods in the near term portion (today, tonight, and tomorrow) in detail. The afternoon issuance will contain four periods in the near term period (tonight, tomorrow, tomorrow night, and the following day) in detail.

An extended forecast out to seven days (Days 3 through 7) will be included at the end of the near term period of the forecast. The extended forecast portion of the narrative forecast will pick up where the short term left off and continue out through day seven. The extended portion is a general forecast which mentions the expected weather conditions, the possibility of precipitation, expected high and low temperatures for each day, and 20 foot winds for days 3 through 7.

A headline may be added to the top of the forecast, denoting significant weather, or for the issuance of a Red Flag Warning or a Fire Weather Watch. Routine forecast content/format will vary somewhat from office to office. The NWS Offices included in this plan will issue the FWF following the standard tabular format in accordance with National Weather Service Directive 10-401 (see Appendix H). Some elements are optional and are not included by all NWS offices. Most Fire Weather Planning Forecasts will include some or all of the following general components:

d. Components:

1. DISCUSSION

The discussion will briefly cover locations of fronts and systems which produce the weather along with highlighting significant trends or changes that the forecaster anticipates.

2. CLOUD/SKY COVER

- A. Clear (or Sunny) -- < 1/8th cloud cover.
- B. Mostly Clear/Mostly Sunny -- 1/8th to 2/8ths of cloud cover.
- C. Partly Cloudy/Partly Sunny-- 3/8ths to 5/8ths of cloud cover.
- D. Mostly Cloudy -- 6/8ths to 7/8ths cloud cover.
- E. Cloudy -- 8/8ths cloud cover.
- F. Increasing Cloudiness -- the clouds are increasing in amount (this also implies thickening of clouds).
- G. Decreasing Cloudiness-- A progressive decrease in the amount of sky covered with clouds.
- H. Variable Cloudiness-- A constant variation in the amount of clouds covering the sky with respect to time and space.

3. PRECIPITATION (PRECIP) TYPE

- A. Rain--General, not showery, usually in a stable atmosphere. Small to medium sized water droplets.
- B. Drizzle--General precipitation in a stable atmosphere. Very small water droplets that appear to float in the atmosphere.
- C. Freezing Rain/Drizzle-- Liquid precipitation that freezes upon impact with the ground or vegetation.
- D. Sleet--Precipitation that falls in the form of frozen rain or partially frozen rain.
- E. Snow--Frozen precipitation of relatively long duration, general or patchy, not showery.
- F. Snow Flurries--Light snowfall of short duration with some clearing between occurrences. Accumulation, if any, is slight.
- G. Showers--Rain/snowfall of short duration and varying intensity, usually beginning and ending abruptly.

- H. Sprinkles-- Light rainfall of short duration with some clearing between occurrences. Accumulation, if any, is slight and measures less than 0.005 inches.
- I. Thundershowers--Same as a shower but accompanied by thunder.
- J. Thunderstorms--Downpour of rain, often with strong gusty winds. Small hail may also be present.
- K. Severe Thunderstorm-- Heavy downpours of rain, accompanied by wind gusts to 50 Knots (58 mph) or greater, hailstones of 1 inch or larger, and/or a tornado.

4. CHANCE PRECIP (%)

The probability of precipitation expresses the chance that measurable rainfall will occur at any given point within a county zone group. Measurable rainfall is 0.01 inches or greater. Probability is expressed in percent.

5. MAXIMUM/MINIMUM TEMPERATURE (TEMP)

The temperature will be in degrees Fahrenheit. The maximum and minimum temperatures are forecast for the day and night time periods, respectively. Local variations in temperature due to terrain (e.g. ridges/valleys) may be mentioned as well.

6. MAXIMUM/MINIMUM HUMIDITY (RH)

The Relative Humidity (RH) is the ratio, in percent, of the amount of moisture in the air compared to the amount the air could hold if fully saturated (100%). The range of RH is from 0% to 100%. Usually, the minimum RH occurs near the time of the maximum temperature and the maximum RH occurs near the time of the minimum temperature.

The minimum or lowest humidity will be forecast for the day period, and the maximum or highest humidity at night.

7. 24 HR TREND (24H TREND)

A forecast element compared to what was observed 24 hours ago.

8. TEMP (24 H TREND)

The average maximum or minimum temperature in each zone or zone group and the trend compared to the prior day.

9. RH % (24 H TREND)

The average max or min humidity in each zone or zone group and the trend compared to the prior day.

10. 20 FOOT WIND

The wind direction applies to the direction from which the wind will blow. The direction will be listed using the 16 point compass (e.g. NE, S, WSW, etc.). Any significant changes expected during the forecast period will be

mentioned in the discussion.

The wind speed will be in miles per hour (mph). The forecast wind speed for the fire weather forecasts will reflect the 10 minute average wind that is commonly measured at fire weather sites. Since most surface observation stations used for National Weather Service forecasts measure wind speed/direction at 10 meters (roughly 33 feet) with a two minute average, a reduction factor is used to arrive at the 20 foot wind forecast.

11. 20 FOOT WIND – AM (20FTWND-AM)

This is also referred to as AM wind or “early”. This is the morning wind direction and speed in miles per hour. Direction is given in the 8 cardinal directions, the direction from which the wind is blowing (N, NE, E, SE...). Sustained speed is representative of the 20 foot level, with 10-minute averaging (as measured at RAWS sites).

12. 20 FOOT WIND-PM (20FTWND-PM)

This is also referred to as PM wind or “late”. The 20FTWND-PM wind contains the same data as The 20FTWND-AM, but for the afternoon and overnight periods only.

13. WIND SHIFT

If a shift in wind direction associated with a frontal passage is expected during the period, it may be mentioned in the Discussion or the Remarks section below the tabular forecast. Because a front may take several hours to move through a zone or group of zones, the approximate time of the wind shift will be encoded (i.e. Northeast 10 to 15 mph after midnight).

14. PRECIP AMOUNT/QPF (INCHES)

The expected average rainfall if rain occurs for a county or zone group will be expressed in decimal notation in inches (i.e. **0.10, 0.50, 1.00, or 1.50**).

15. PRECIP DURATION

This is the average duration in whole hours that precipitation will occur in the county or zone group.

16. PRECIP BEGIN

This is the forecast beginning time of precipitation, given in local time in whole hours.

17. PRECIP END

This is the forecast end time of precipitation, given in local time in whole hours.

18. MIXING HEIGHT/MAX MIXING HEIGHT/MIXING HGT

Mixing height is the extent or depth to which smoke will be dispersed by means of turbulence and diffusion. The forecast of mixing height is typically expressed in feet above ground level (AGL) and is the maximum mixing height expected (generally during the afternoon). This value will be expressed as the average over the entire county zone or zone group.

19. TRANSPORT WIND

Transport wind is the average wind speed expressed in either meters per second (m/s) or in miles/hour (mph) or knots (KTS) in the mixing depth above the surface. These winds are a good indication of the horizontal dispersion of suspended particles. The transport wind is the forecast wind at the time of maximum mixing of the atmosphere, normally during the mid afternoon. Usually a wind of less than 4 m/s restricts an agency from burning. Transport wind directions are typically given to eight compass points (e.g. northeast, east southwest, etc.)

Note: Transport winds are not encoded for the nighttime portion of the forecast.

20. 1700 FOOT (500 METER) MIXING HEIGHT TEMPERATURE

This is the surface temperature that must be reached in order for the mixing depth to reach 1700 feet. Once the forecast temperature is reached at the burn site, it can be assumed that the mixing height above the burn site is at least 1700 feet or 500 meters.

Note: One consequence of the Clean Air Act, is that land managers must practice principles of careful smoke management. This is done by combining favorable meteorological conditions with a variety of prescribed fire techniques so that smoke will be readily dispersed. The 1700 foot/500 meter mixed layer is a common suggested minimum mixing layer depth for prescribed burning to limit the concentration of particulate matter near the ground and to limit the aerial coverage of limited visibility due to smoke. Local regulations or practices may differ.

21. HAINES INDEX

The Haines Index is used to indicate the potential for wildfire growth by measuring the stability and dryness of the air over a fire. It is calculated by combining the stability and moisture content of the lower atmosphere into a number that correlates well with large fire growth. The stability term is determined by the temperature difference between two atmospheric layers; the moisture term is determined by the temperature and dew point difference. This index has been shown to be correlated with large fire growth on initiating and existing fires where surface winds do

not dominate fire behavior. The Haines Index can range between 2 and 6. The drier and more unstable the lower atmosphere is, the higher the index.

The Haines Index used by NWS Offices which make up this plan will either be the low or mid elevation Haines Index. The low elevation is generally used for elevations of 1,000 feet above sea level and below (most areas), while the mid elevation Haines Index is normally used for locations with elevations between 1,000 and 3,000 feet above sea level (used by WFO JKL and WFO RLX). Values of the Haines Index range from 2 to 6. The Haines index correlates large plume dominated fire growth.

Interpreting the Haines Index

- 2 Very Low Potential (Moist and Stable Lower Atmosphere)
- 3 Very Low Potential
- 4 Low Potential
- 5 Moderate Potential
- 6 High Potential (Dry Unstable Lower Atmosphere)

22. VENTILATION RATE (VENT RATE)/SMOKE DISPERSAL

The Vent Rate is a number that gives a relative indication of how well smoke will disperse in the atmosphere. It is calculated by taking the Mixing Height (in FT AGL) multiplied by the transport winds in knots. Units are in KNOT-FT.

$$\text{Vent Rate (kt-ft)} = \text{Mixing Height (ft)} * \text{Average Transport Winds (kt)}$$

The table on the following page gives an interpretation for a given value of Vent Rate used by NWS Jackson and NWS Louisville:

Vent Rate	Interpretation
< 29,000	Poor
≥ 29,000 & < 38,000	Marginal
≥ 38,000 & < 50,000	Fair
≥ 50,000 & < 95,000	Good
≥ 95,000	Excellent (Burn with caution)

The table below gives an interpretation for a given value of Vent Rate used by NWS Paducah:

Interpretation	Vent Rate (kt-ft)	Vent Rate (m/s-m)
Excellent	≥ 150,000	≥ 23445
Very Good	≥ 100,000 and < 150,000	≥ 15630 and < 23445

Good	$\geq 60,000$ and $< 100,000$	≥ 9378 and < 15630
Fair	$\geq 40,000$ and $< 60,000$	≥ 6252 and < 9378
Interpretation	Vent Rate (kt-ft)	Vent Rate (m/s-m)
Poor	$\leq 40,000$	≤ 6252

23. DISPERSION INDEX

The Dispersion Index is a number that gives a relative indication of how well smoke will disperse in the atmosphere. It is calculated by taking the Mixing Height divided by 1000 and then multiplying the result by the transport winds in knots. See the table below for an interpretation for a given Dispersion Index value.

Dispersion Index	Interpretation
> 100	Very Good
60-100	Good
41-60	Fair to Good
21-40	Fair
13-20	Poor to Fair
7-12	Poor
1-6	Very Poor

24. DISPERSION

Dispersion indicates the forecast smoke dispersion category for the overnight periods only. (4 knots = 4.6 mph; 8 knots = 9.2 mph; 12 knots = 13.8 mph)

Value	Interpretation	Wind Speed
1	Very Poor	≥ 4 knots
2	Poor	> 4 and ≤ 8 knots
3	Good	> 8 and ≤ 12 knots
4	Excellent	> 12 knots

25. DAVIS STABILITY INDEX (DSI)

The Davis Stability Index is a common fire stability index parameter utilized primarily in the southeast United States. The formula for the Davis Stability Index is as follows: Davis Stability Index (DSI) = Max Temp (deg C) - 850mb Temp (deg C) If the difference is less than 10 deg C, it is considered a Category 1 or stable. If the difference is 10 deg C to 14 deg C, it is considered a Category 2 or conditionally unstable. If the difference is 15 deg C to 17 deg C, it is considered a Category 3 or unstable. If the difference is greater than 17 deg C, it is considered a Category 4 or absolutely unstable.

26. ATMOSPHERIC DISPERSION INDEX BY LAVDAS (ADI)

Atmospheric dispersion is the process by which the atmosphere mixes and transports particulates, such as smoke, away from their source. The Atmospheric Dispersion Index (ADI) was developed by the U.S. Forest Service to assess the impact of prescribed burning activity on atmospheric smoke concentrations and air quality. The same processes responsible for good smoke dispersion also contribute to erratic fire behavior and may present very hazardous conditions. See NWCG Smoke Management Guide for Prescribed Fire PMS 420-3 from November 2020 for further information and references.

Interpretation of Daytime ADI Values

ADI	Description/Interpretation
1-6	Very Poor dispersion. Visibility will be reduced on nearby roadways at this ADI level. The RRP or mitigation actions will need to be implemented. If ADI is sole criteria, risk for smoke impacts is extremely high.
7-12	Poor dispersion. Nearby roadways are highly likely to be impacted at this ADI level. The Roadway Response Plan (RRP) or mitigation actions will need to be implemented. If ADI is the sole criteria, risk for smoke impacts is very high. Prescribed fires are permissible under certain circumstances if other criteria are used to support decisions. Other criteria could include dispersion models, air monitors, or other metrics (i.e. light fuels, small acreage, burn within day dispersion window, etc.).
13-20	Generally Poor dispersion. Nearby roadways are very likely to be impacted at this ADI level, the Roadway Response Plan (RRP) or mitigation actions will likely need to be implemented. If ADI is the sole criteria, risk for smoke impacts is high. Other criteria are recommended to support decisions such as dispersion models, air monitors, or other metrics (light fuels, small acreage, burn within day dispersion window, etc.).
21-40	Fair dispersion. Characterized by persistent low wind speeds which facilitate poor air movement and can cause reduced roadway visibility. At this ADI level any residual smoke is likely to result in problems if surface wind speed is less than three mph. If nearby roadways are impacted at this ADI level, the Roadway Response Plan (RRP) a or mitigation actions will likely need to be implemented. For example, the Minimum Acceptable Visibility (MAV) methodology for paved roads may indicate drivers should reduce vehicle speed due to low visibility. Some states, when solely using ADI, do not permit prescribed burning with ADI values ≤ 30 .
41-49	Generally Good dispersion. Impacts are more likely under these typical afternoon meteorological conditions. Generally good dispersion assuming fuels are mostly consumed in this dispersion window, before night, with minimal smoldering of larger surface (1000-Hr) or ground fuels.
50-59	Good dispersion. Ground impacts may occur. At this ADI level, only very dense low surface smoke can obstruct roadway visibility.

60-69	Very good dispersion. Ground impacts are unlikely, however very dense low surface smoke could impact nearby roadway visibility. Single fire smoke issues seem unlikely but be aware of cumulative smoke effects from multiple fires.
70+	Excellent dispersion. Ground impacts are unlikely, however very dense low surface smoke could impact nearby roadway visibility. Control problems are likely.

Interpretation of Nighttime ADI Values

ADI	Description/Interpretation
1-4	Very Poor dispersion. At this ADI level night smoke dispersion is “VERY POOR” with surface wind speeds < 5 mph. Roadway visibility will be reduced due to smoke, smoke induced fog, or natural fog. RRP or mitigation actions will need to be implemented. Minimum acceptable visibility (MAV) for paved roads needs to be used and traffic control is very likely required. With surface wind speeds < 2 mph, night smoke dispersion is “STAGNANT”. Roadway visibility will be seriously reduced and road closure should be considered. RRP or mitigation actions will be needed.
5-7	Poor dispersion. At this ADI level night smoke dispersion is “POOR” with surface wind speeds 5 to 7 mph. Roadway visibility is likely to be reduced. RRP or mitigation actions will likely need to be implemented. Traffic control beyond reduced speed may be required, for example the use of an unoccupied lighted law enforcement vehicle.
8-12	Fair dispersion. At this ADI level night smoke dispersion is “FAIR” with surface wind speed 8 to 12 mph. Roadway visibility may be impacted due to dense surface smoke. If there is dense surface smoke it may require adjusting vehicle speed to existing conditions, take mitigation actions or consult the RRP.
13-20	Good dispersion. At this ADI level night smoke dispersion is “GOOD”, surface wind speed > 12 mph. Roadway visibility is only likely to be impacted due to dense surface smoke crossing the roadway, take mitigation actions or consult the Roadway Response Plan (RRP).

27. LOW VISIBILITY OCCURRENCE RISK INDEX (LVORI)

Low Visibility Occurrence Risk Index (LVORI) is derived from the Lavdas ADI and the relative humidity, which gages the probability of visibility restrictions in fog or smoke. There are 10 LVORI categories; ranging from 1 (indicating the lowest probability of visibility restrictions) to 10 (indicating the highest probability of visibility restrictions).

LVORI Category	Interpretation
1	Lowest proportion of accidents with smoke and/or fog reported (130 of 127,604 accidents, or just over 0.0010 accidents)

2	Physical or statistical reasons for not including in category 1, but proportion of accidents not significantly higher.
3	Higher proportion of accidents than category 1, by about 30% to 50%, marginal significance (1%-5%)
4	Significantly higher than category 1, by a factor of 2.
5	Significantly higher than category 1, by a factor of 3 to 10.
6	Significantly higher than category 1, by a factor of 10 to 20.
7	Significantly higher than category 1, by a factor of 20 to 40.
8	Significantly higher than category 1, by a factor of 40 to 75.
9	Significantly higher than category 1, by a factor of 75 to 125.
10	Significantly higher than category 1, by a factor of 150.

28. LIGHTNING ACTIVITY LEVEL (LAL)

A single digit (1 through 6) will be used. The meaning of each number is as follows:

- 1 No thunderstorms.
- 2 Few building cumulus with isolated thunderstorms. Occasional light rain reaching the ground.
- 3 Widely scattered thunderstorms with much building cumulus. Light to moderate rain reaching the ground.
- 4 Scattered thunderstorms, not obscuring the sky. Moderate rain reaching the ground.
- 5 Numerous thunderstorms, occasionally obscuring the sky. Moderate to heavy rain reaching the ground.
- 6 Same as 3 above, but dry, no rain.

29. Outlook 8 to 14 days...

The extended outlook is taken from a daily forecast produced by the Climate Prediction Center (CPC). It includes temperature and precipitation trends compared to seasonal normal values for the time periods. ABOVE NORMAL, NEAR NORMAL, or BELOW NORMAL will be given. For more information on this and other extended outlooks, please see the CPC website at www.cpc.ncep.noaa.gov.

30. Remarks

Appropriate remarks are included in this section that add value to the forecast, mark significant weather changes, or to annotate any additional information that is pertinent to the forecast.

2. INDIVIDUAL STATION FORECASTS (FWM)/NATIONAL FIRE DANGER RATING SYSTEM FORECASTS (NFDRS)

The National Fire Danger Rating System measures wildland fire danger at

observation sites throughout the contiguous United States. The National Weather Service role in NFDRS is forecasting weather input which, combined with user input, allows the NFDRS software to predict fire danger indices for the next seven days. These indices impact agency resource management decisions, firefighter safety, and protection of the public and property. Note that a NFDRS station may represent a large fire danger rating area of similar climatology and fuel type. NFDRS forecasts for a station are intended to be applied across a large fire danger rating area.

The Fire Weather Matrices forecasts (FWM) will be issued at least daily year-round for any predetermined site for which an NFDRS observation is received. Per NWSI 10-401, representative observations for use in making NFDRS projections can also be accessed by other dependable means, including the Mesowest page and state RAWS collectives from the Internet, etc.

The natural resource agencies will determine which observation sites (normally RAWS sites) will be NFDRS sites. Initiation of an NFDRS forecast for a new site will be coordinated with the NWS, and the agency requesting new NFDRS service will provide the NWS with information about the site location. The NWS will notify the owner agency when bad data is received from a RAWS station.

a. Procedures for Land Management Agencies

Per NWSI 10-401, weather observations valid for approximately 1300 Local Standard Time (LST) are taken by the land management agencies and transmitted through AWIPS using the FWO product ID. This product should have a header above the data which states “**Listing of Observations**”. Forecasters will use these observations as a basis for generating forecasts valid 24 hours later (the NFDRS forecast), so NFDRS forecast issuance times are dependent on the arrival of these observations. Forecasts will only be prepared for predetermined sites, and usually only from those sites for which an observation has been received.

b. FWM forecast Issuance Times and Locations

The NWS offices will normally produce the NFDRS forecast at least once daily around 1500 LST. The NWS Offices included in this plan issue forecasts for numerous points. A table of the RAWS sites is included in Appendix F, while a map of the RAWS sites is included in Appendix E.

Note: All fire weather stations have been assigned numbers to be used as the identification number when entering into the Weather Information Management System (WIMS). If a new station is established, or a present Station is moved, a new identification number should be requested from the GACC Meteorologists. Also, please notify the local NWS Office Fire Weather Program Manager of this change.

Point Forecast Terminology: The point forecast follows the general

format below:

FCST, ID,DATE,VT,WX,TT,RH,L1,L2,DD,VV,M,TX,TN,HX,HN,D1,D2,WETFLAG

FCST

FCST shows that this is a forecast for an NFDRS individual station.

ID (STATION NUMBER)

Before a forecast will be made for a station, it must have a valid station number in WIMS.

DATE (Valid Date)

The valid date will be the next day in the order: YYMMDD

VT (VALID TIME)

The valid time will be 1300 LST the next day

WX (State of the Weather)

A single digit number from 0 to 9.

- 0 Clear (Less than 1/10th of sky is cloud covered).
- 1 Scattered Clouds (1/10th to 5/10ths of sky cloud covered).
- 2 Broken Clouds (6/10ths to 9/10ths of sky cloud covered).
- 3 Overcast (More than 9/10ths of sky cloud covered).
- 4 Foggy
- 5 Drizzle
- 6 Rain
- 7 Snow or Sleet
- 8 Showers (In sight or at station and reaching the ground).
- 9 Thunderstorms/Hail

TT (TEMPERATURE)

Forecast of temperature in degrees F for 1300 the next day.

RH (Relative Humidity)

Relative Humidity forecast for 1300 the next day.

L1, L2 (LIGHTNING ACTIVITY)

- 1. Period 1 (**L1**) is from 1400 LST until 2400 that night (a 10 hour period).
- 2. Period 2 (**L2**) is from 0000 the night of the forecast until 2400 the next night (24 hour period.)
- 3. A single digit (1 through 6) will be used.
The meaning of each number is as follows:
 - 1 No thunderstorms
 - 2 Few building cumulus with isolated thunderstorms

- 3 Much building cumulus with scattered thunderstorms, light to moderate rain reaches the ground.
- 4 Thunderstorms common but do not obscure the sky, moderate rain reaches the ground.
- 5 Thunderstorms common and occasionally obscure the sky, moderate to heavy rain reaches the ground.
- 6 Same as 3 above but dry, no rain

DD (WIND DIRECTION)

20 foot wind direction forecast at 1300 LST the next day.

VV (WIND SPEED)

20 foot wind speed forecast at 1300 LST the next day.

M (TEN HOUR TIME LAG FUEL MOISTURE)

Forecasters will not forecast 10 hour fuel stick moisture and M or a blank between commas will be used as a place holder.

TX (MAX TEMPERATURE)

The 24 hour maximum temperature forecast for 1300 the day of the forecast until 1300 the next day. This will typically be the maximum temperature of the current day.

TN (MIN TEMPERATURE)

The 24 hour minimum temperature forecast from 1300 the day of the forecast until 1300 the next day. This will typically be the overnight low expected in the next 12 to 16 hours.

HX (MAX RELATIVE HUMIDITY)

The 24 hour maximum Relative Humidity forecast from 1300 the day of the forecast until 1300 the next day.

HN (MIN RELATIVE HUMIDITY)

The 24 hour minimum Relative Humidity forecast from 1300 the day of the forecast until 1300 the next day.

D1 PRECIPITATION DURATION

The number of hours for which precipitation is forecast from 1300 the day of the forecast until 0500 the next day (16 hours).

D2 PRECIPITATION DURATION

The number of hours for which precipitation is forecast from 0500 the next day until 1300 that same day (8 hours).

WET FLAG

Wet flag is used to indicate "fuels wet". All indices will be forced to zero if Y=yes is used. NOTE: in most cases an N=no will be used unless there is snow on the ground or the ground is extremely wet. If the duration of precipitation is 3 hours or greater between 500 am to 100 pm of the next day, the Wet Flag should be tripped to a Y value. Also if rain or snow is expected to be occurring at 1300, the Wet Flag should be tripped to a Y value.

3. Site-Specific Wildfire Forecasts/Prescribed Fire Forecasts (FWS)

SPOT forecasts are issued when requested by wildland fire and land management agencies for wildfires or planned prescribed fire operations or by federal, state, tribal, or local officials or agencies or public safety official responding to hazardous material releases or other emergencies such as search and rescue operations, who represents that the spot forecast is essential to public safety. They are available 24 hours a day. Spot forecasts differ from routine fire weather forecasts as they are site-specific, localized weather forecasts that incorporate greater detail in timing, higher resolution of terrain influences, as well as other small-scale weather influences impacting the site. They should be requested within 24 hours of a prescribed fire. Beyond 24 hours, the Fire Weather Planning Forecast (FWF) or Activity Planner (see links for each office on pages 8-11), etc. should be utilized.

NWS offices will not provide spot forecasts to private citizens or commercial entities not acting as an agent of a government agency.

a. Criteria

Federal or state agencies requesting prescribed fire or spot forecasts should provide as much information as possible about the location and nature of the site. The more accurate the information received about the site, the more accurate the resulting forecast will be. Current weather information from the site, including temperature, wind speed, and relative humidity will increase the accuracy of the forecast. The following information about the prescribed fire or wildfire site should be included:

1. location
2. elevation
3. slope
4. aspect
5. **Whenever possible, it is requested that agencies provide maps of the prescribed fire area from the prescribed burn plan to further clarify the burn area.** This information will aid the forecaster in providing a more specific forecast tailored to the local terrain.
6. **A current observation at the time a wildfire forecast**

is requested whenever possible. For a prescribed fire forecast, an observation or observations around 1300 from the the previous afternoon is requested.

b. Contents

All Spot or Prescribed fire forecasts will contain at least items 1 through 5, with additional forecast elements on request.

1. sky condition
2. weather
3. temperature
4. relative humidity
5. 20 foot wind
6. mixing height
7. transport winds, etc.

c. Procedure

1. Requests for Spot or Prescribed Fire forecasts will be made using the Spot Forecast Request Page at <https://spot.weather.gov/>.
2. As a courtesy, land management agencies are requested to call the appropriate National Weather Service Office to confirm receipt of the spot or prescribed fire forecast request.
3. Once the forecast is completed, it will be available on the NWS Spot Page in the NWS Spot Forecast Monitor Section.
4. If the NWS Spot page server is down, requests for a spot forecast should be called in or faxed to the forecast office. Faxed requests should be made using WS Form D-1 in Appendix N or available online at <https://www.weather.gov/media/maf/firewx/WSFormD1.pdf>. In this case, the National Weather Service Office will send the forecast by fax or may give it verbally over the phone upon request (i.e., when only a few weather elements are necessary by the user).
5. **The National Weather Service Headquarters has directed that NWS forecasts should not be forecasting eye-level winds.** Forecasters don't know exact sheltering, vegetation or exposure at the forecast location and thus don't know what conversion factors to use. It is better to let land management agencies take the forecast 20-ft winds and do the conversions themselves to get a better value for eye level winds to use in fire behavior forecasts.
6. **Instructions for requesting a forecast:**
 - a. Go to the Spot Forecast Request page at: <https://spot.weather.gov/>.

- b. Fill in as much information as possible (items with a red asterisk are required):
1. In Step 1, **Establish Incident Location** in A or for exact Latitude and Longitude use B. Check the map further down the page to ensure the marker is in the correct location. If not, adjust A or B as needed to fine tune the location.
 2. In **Step 2**, select the incident type for the request, Wildfire or Prescribed Fire, etc. as Appropriate.
 3. Click the Generate Spot Request button to proceed.
 4. Fill out the **Contact Information** Section. By sharing an email address you will receive a copy of the completed forecast via email as well as links to request an update or provide feedback, etc.
 5. If applicable, select the Reason for the Spot Request as appropriate.
 6. In the **Location** section, check the Latitude and Longitude and Elevation Top and Elevation Bottom and modify as needed.
 7. In the **Fire Weather Supplemental Information** section, include the Size, Aspect, Fuel type, and Sheltering information as appropriate. For Aspect, please note valley or ridgetop, north, south, east, west, or all aspects as appropriate.
 8. In the **Forecast Information** section, modify the Forecast Starting date and time as appropriate. Modify the Deliver Forecast date and time as needed or select the button for deliver as soon as possible.
 9. For **Forecast Format**, select Combined and adjust the **Tabular Time Table Interval** for the forecast period(s) as needed. Select the needed weather elements from the lists for each time period.
 10. For the **NOAA Hysplit Model** section, no is the default. Select Yes-Trajectory Output to have the results emailed to you. If Plume Output is needed, you will be directed to contact the appropriate NWS office to explain. See Appendix K for further information.
 11. If you wish to receive **Future Forecasts** for this request, select the Yes button and up to 5 future update dates and times can be included.
 12. Provide any remarks regarding future update needs or details of the location and incident, etc. as applicable for the incident.
 13. Observations are optional, but include whenever

possible by entering the information in the Observations section.

14. Hit **Submit Request** at the bottom of the page. Once your request is submitted, it should alarm on the computer system at the local National Weather Service office and the National Weather Service will compile a weather forecast specifically for the location of the wildfire or prescribed fire, etc.

7. **Retrieving a forecast:**

- a. Allow adequate time for the forecaster to prepare the forecast. This will normally be 30 to 60 minutes.
- b. Once a spot forecast has been requested in NWS Spot, the user is automatically redirected to the NWS Spot Forecast Monitor section. Upon completion of the SPOT forecast by the NWS Office, the forecast will be delivered via email to the email address of the requestor and can be accessed by multiple users, simply by clicking on the incident/fire name from the ID column or by clicking on the appropriate Spot Forecast Marker on the map and clicking the id number. Once a forecast is completed, the Spot Forecast marker changes to green from pending (orange). Or if the request is via fax, the NWS will fax the completed forecast.

8. **Additional Information**

- a. Contact the responding NWS Office for a SPOT update if forecast conditions appear unrepresentative of the actual weather conditions. When possible, provide feedback to the NWS Office during or shortly after an event. Feedback can be sent from the Feedback box located at the bottom of the page that displays the forecast. Feedback will assist forecasters in subsequent forecasts.
- b. Land management agencies can test out the online request page. For a TEST SPOT request, please contact the appropriate NWS Office to tell one of the forecasters that you are doing so, and include "TEST" within the name of the incident on the SPOT request form.

4. **Smoke Modeling Plumes from HYSPLIT**

As noted above on page 28, Land management agencies may request that the National Weather Service run the NOAA Air Resources Laboratory dispersion model, HYSPLIT Trajectory Output, to model smoke dispersion when requesting a Wildfire or Prescribed Fire Forecast. This model is a combination of the U.S. Forest Service's Blue Sky Model and meteorological models used by NWS Forecasters. The data is output in a graphical format. This data can be used in combination with a typical spot forecast that is used for Prescribed Fire and Wildfires for decision making purposes. Further instructions on how to request a

HYSPLIT run within the Spot Page can be found in Appendix K and on page 28.

5. Fire Weather Watch and Red Flag Warning Program

Specific conditions must be met for a Fire Weather Watch and/or a Red Flag Warning to be issued for locations in Kentucky. These conditions are as follows:

- a. Ten hour fuel moisture values must be 8% or less.
- b. Relative humidity levels are expected to fall to 25% or less (less than 25% for WFO PAH)
- c. 20 foot sustained winds are expected to reach or exceed 15 mph (>15 mph for WFO PAH)

If the forecast office issues a Fire Weather Watch or Red Flag Warning for a specific forest, district, or national park, the fire weather forecaster will highlight the watch or warning in the narrative forecast by using a headline. As time allows, the NWS offices should contact the user agencies or State Coordination Centers. A "**Fire Weather Watch**" is used to alert the user to the possible development of a Red Flag event in the near future (18 to 96 hours in advance of the expected onset of criteria). Usually, a forecaster has a 50% confidence that the event will occur when issuing one.

A "**Red Flag Warning**" will be issued to warn the user of an impending or ongoing Red Flag event. A Red Flag Warning will be issued immediately when Red Flag Conditions are occurring. Otherwise, it will be issued for impending Red Flag Conditions when there is a high degree of confidence that conditions will develop. Usually, a forecaster has an 80% confidence that the event will occur when issuing one.

C. Special Services

Special meteorological services meet the needs of agencies that often have unique requirements for weather support, and may best be performed by the fire weather meteorologist away from the home forecast office. These services usually must be initiated by the requesting agency, and costs such as travel and per diem will be charged to a reimbursable task number assigned for the project. Special services may include fire weather station visits, familiarization trips to the forest, observer training sessions, and S-290, S-390, S-490, and other courses. The fire weather meteorologist may be asked to attend a prescribed burn when available. If the trip involves an overnight stay, the request should state that the requesting agency will pay travel expenses. A one day trip will not incur any costs to the requesting agency. When the land management agency wishes for a fire weather forecaster to attend a course, the same procedure for requesting a forecaster to a station visitation should be followed, except that specific dates should be given in the request. The request will be forwarded to NWS Central Region Headquarters so that a reimbursable task code can be assigned for the trip.

1. Incident Meteorologists (IMETs)/On Site Support

On-site forecast service is a non-routine service available from National Weather Service Offices with designated Incident Meteorologists (IMETs). The NWS will provide IMET services upon request of federal, state, tribal, or local government fire agencies in support of wildfires. This support typically includes dispatches to Incident Command Posts, but may also include dispatches to land management coordination and dispatch centers, and Area Commands. IMET support is also available for non-wildfire situations such as prescribed burns. However, those requests are limited to federal fire agencies participating in the Interagency Agreement for Meteorological and Other Technical Services by a public safety official who represents such support as essential to public safety. Procedures to request the services of an IMET are detailed in NWS Instruction 10-402.

2. Other Decision Support Services

Other Non-routine services may be performed at the request of the land management agencies and/or state or local emergency management. These include briefings, webinars, or coordination calls prior to the Spring or Fall Fire Weather season, during periods of increased fire danger, during extensive prescribed burning, or during periods of high fire occurrence. The FWPL and MIC from the requested office or offices will ensure that the land management agency needs are met with little or no expense to either the land management agency or the NWS.

3. Training

When the land management agency wishes for a fire weather forecaster to attend a course or be an instructor for a course, the same procedure for requesting a forecaster to a station visitation should be followed, except that specific dates should be given in the letter. The letter or email request will be forwarded to the NWS Regional Headquarters so that a reimbursable task code can be assigned for the trip.

4. Fire Weather Station Visits

A fire weather forecaster may be requested to accompany an official on a fire weather station visitation. A letter or email requesting the meteorologist should be mailed or emailed to the WFO at least 2-3 weeks in advance of the planned trip. The message does not need to be specific about dates, this can be arranged over the phone. If the trip involves an overnight stay, the message should state that the requesting agency will pay travel expenses. A one day trip will not incur any costs to the requesting agency.

Supplies, equipment, and maintenance of the fire weather station are the responsibility of the land management agency.

If a new station is being established, or an old station is moved to another

location, a station number will be assigned by the fire weather program leader for the appropriate National Weather Service Central Region.

5. NOAA ALL HAZARDS RADIO

Kentucky has a statewide network of NOAA All Hazard Radio Transmitters. These 24-hour broadcasts provide continuous up-to-date weather information directly from the National Weather Service. Weather messages are typically repeated every three to six minutes with longer cycles possible during periods of active weather. The broadcast is routinely monitored and revised every few hours. The broadcasts are tailored to the weather needs of the people within the receiving area. These broadcasts can usually be heard as far as 40 miles or more from the antenna site depending on terrain, receiver quality, and other factors.

The quality of the reception of broadcasts may depend greatly upon the quality of the receiver. Receivers vary in cost from around \$20 to more than \$100. Specially designed receivers sound an alarm activated by the National Weather Service to warn of severe weather, or that an emergency exists. Specific Area Message Encoder (SAME) radios are available for around \$40 that will allow the user to program in which county or group of counties he wants to hear the alarm tone for. Fire Weather Watches are not typically broadcast on NOAA Weather Radio. The Jackson office **will** broadcast Red Flag Warnings for counties in the Jackson, Morristown, and Charleston CWAs that fall in the Jackson NOAA All Hazards Radio broadcast reach.

For a more information about NOAA All Hazards Radio visit the following website:

<https://www.weather.gov/nwr/> or for information on county by county coverage visit:

<https://www.weather.gov/nwr/counties>.

6. Special Weather Statements/Public Information Statements

When fire danger or fire occurrence is high, coupled with near-critical weather conditions, agencies may request that the NWS issue a Special Weather Statement (SPS) or Public Information Statement (PNS). These statements are generally rare, and issued in coordination with the requesting agency. The SPS or PNS can be broadcast on NOAA Weather Radio All-Hazards and will show up on National Weather Service webpages.

Example:

...Enhanced Fire Danger Today...

Here is a Wildfire Danger Statement issued in coordination with [Agency] in [City, State].

For [Day Month Date Year] the wildfire danger is [High, Very High, or Extreme] for the [Geographic area of danger] of Northeast Kentucky.

Open burning of any type is considered extremely dangerous at this time. Be very careful of heat and sparks while operating any equipment or smoking in wildland areas.

7. Hazardous Weather Outlooks

Hazardous Weather Outlooks are issued by weather forecast offices to alert the public to potentially dangerous weather situations. When a combination of meteorological conditions leads to an increased fire danger, but falls short of Fire Weather Watch or Red Flag Warning criteria, the product may include this information to inform the public of a heightened fire danger and to discourage open burning and careless use of smoking materials. Approval of the user agencies is not necessary to issue this statement. Fire Weather Watches and Red Flag Warnings may also be mentioned within the Hazardous Weather Outlook. An example of this product can be found in Appendix M.

VII. Natural Resource Agency Responsibilities

Participating agencies should review the AOP and provide the Fire Weather Program Leaders with any suggestions or additions that may be needed along with suggestions that may lead to improved services. Responsibilities consist of Operational support and predictive services.

- A. Program Management**
- B. Monitoring, feedback and improvement**
- C. Technology Transfer**
- D. Agency Computer Systems**
- E. Fire Weather Observations**
- F. On-site support**
- G. Training**

VIII. Joint Responsibilities

Service boundaries, fire weather zones, stations for which an NFDRS (FWM) forecast is issued, fire weather forecast areas and groupings may be negotiated to meet customer and forecaster need.

IX. Backup Procedures (for users)

From time to time NWS offices need to go into backup mode. This is usually during a period of software or hardware upgrading or perhaps a power or communications failure. If forecasters at a particular WFO are unable to be reached, you may try the primary backup office. Primary and Secondary Backup Offices for each WFO are located in the National Weather Service Offices and Contact Numbers starting on page 8.

X. Signature Page

This Operating Plan becomes effective when all parties have signed the approval letters and will be effective until superseded by the 2024 Operating Plan.

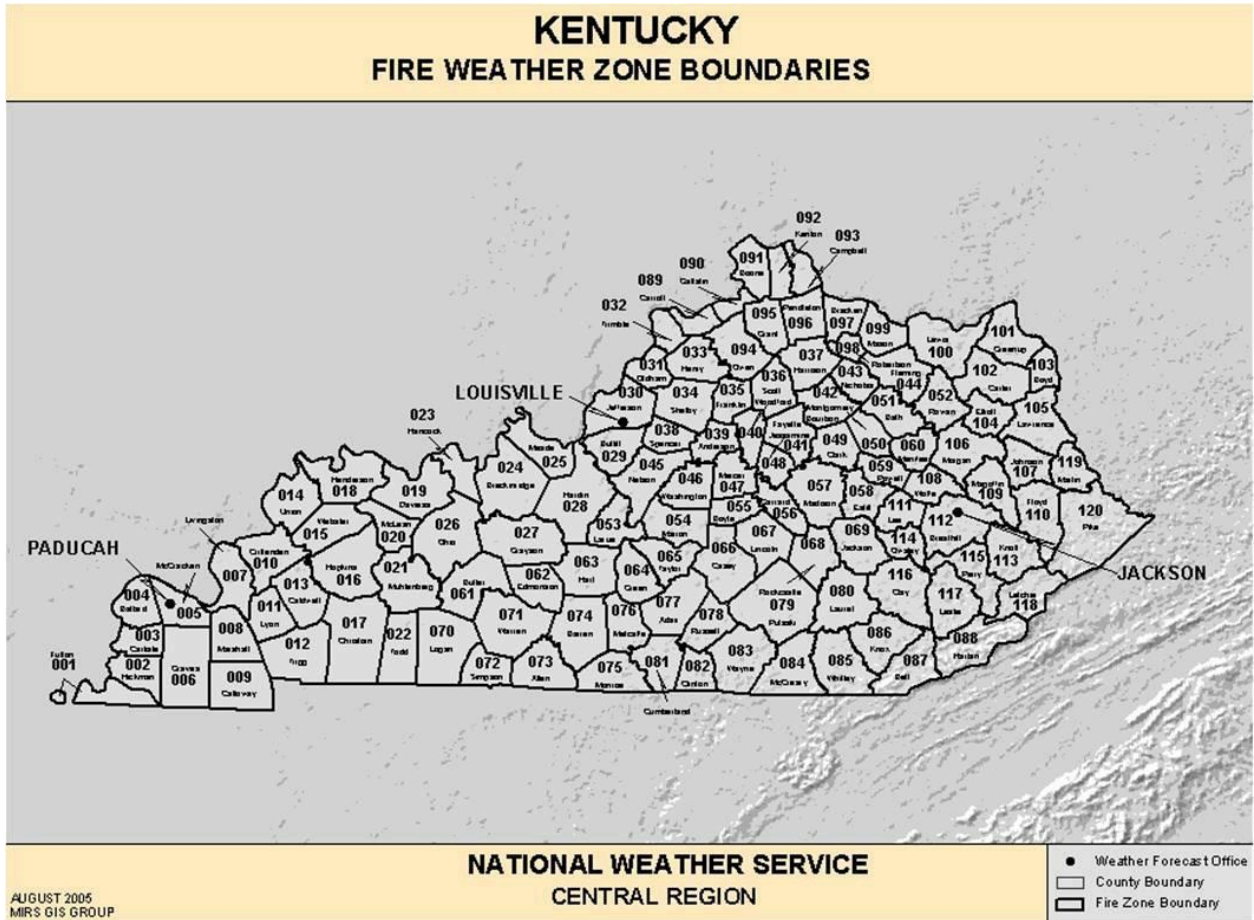
An approval email will be sent to the agency listed below. Copies of these letters and/or an electronic signature will be kept on file at the National Weather Service Forecast Offices.

Office	Approving Authority	Date Signed
NWS (KY State Liaison Office)	John Gordon, MIC WFO LMK	12/18/2024
Daniel Boone National Forest/Kentucky Interagency Coordination Center	Ryle Benke, Forest FMO	12/9/2024
Jefferson National Forest Clinch Ranger District	Kenneth Cooper , Zone FMO	12/13/2024
Land Between the Lakes NRA	Russell Harris, FMO	6/6/2024
KY Department of Fish and Wildlife	Jacob Stewart, Wildlife Division Assistant Director	6/6/2024
KY Division of Forestry	Michael Froelich, Fire Management Chief	8/27/2024
Office of Kentucky Nature Preserves	Heidi Braunreiter, Prescribed Fire Program Coordinator	6/21/2024
Big South Fork NRRRA	Doug Sprouse, Zone FMO	6/6/2024
Cumberland Gap NHP	Doug Sprouse, Zone FMO	6/6/2024
Abe Lincoln Birthplace NHP	Doug Sprouse, Zone FMO	6/6/2024
Mammoth Cave National Park	Doug Sprouse, Zone FMO	6/6/2024
DOD Bluegrass Army Depot	N/A	
DOD Fort Campbell	N/A	
DOD Fort Knox	N/A	
Clarks River NWR	Michael Johnson	8/27/2024

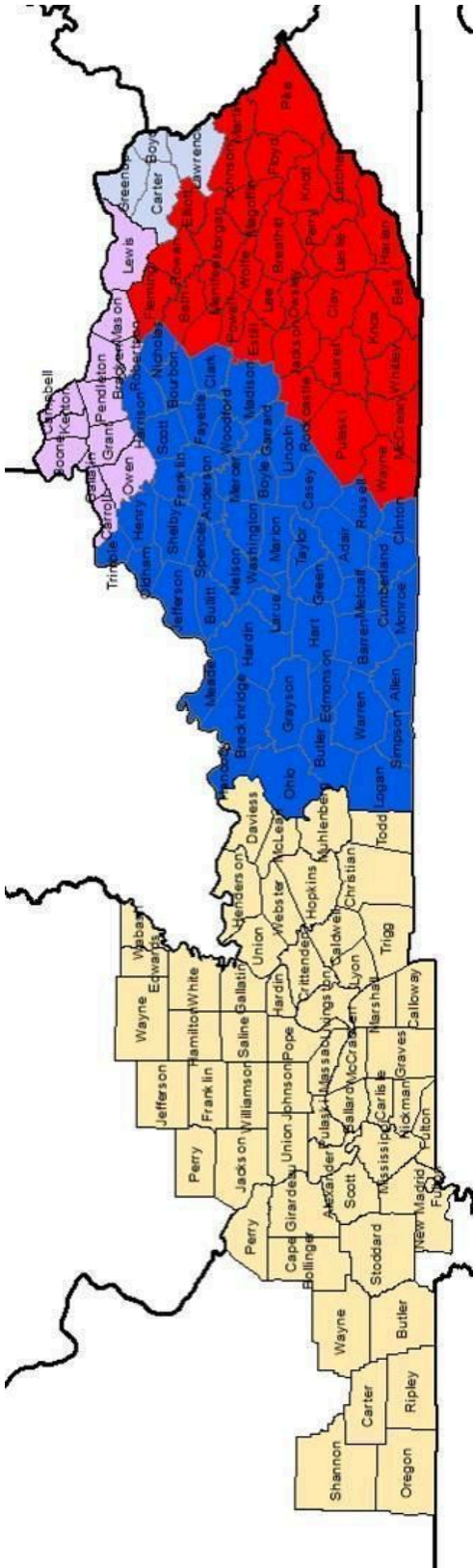
Office	Approving Authority	Date Signed
Green River NWR	Michael Johnson	8/27/2024
Reelfoot NWR	Randy Cook	6/6/2024
The Nature Conservancy	Chris Minor	6/6/2024

XII: Appendices

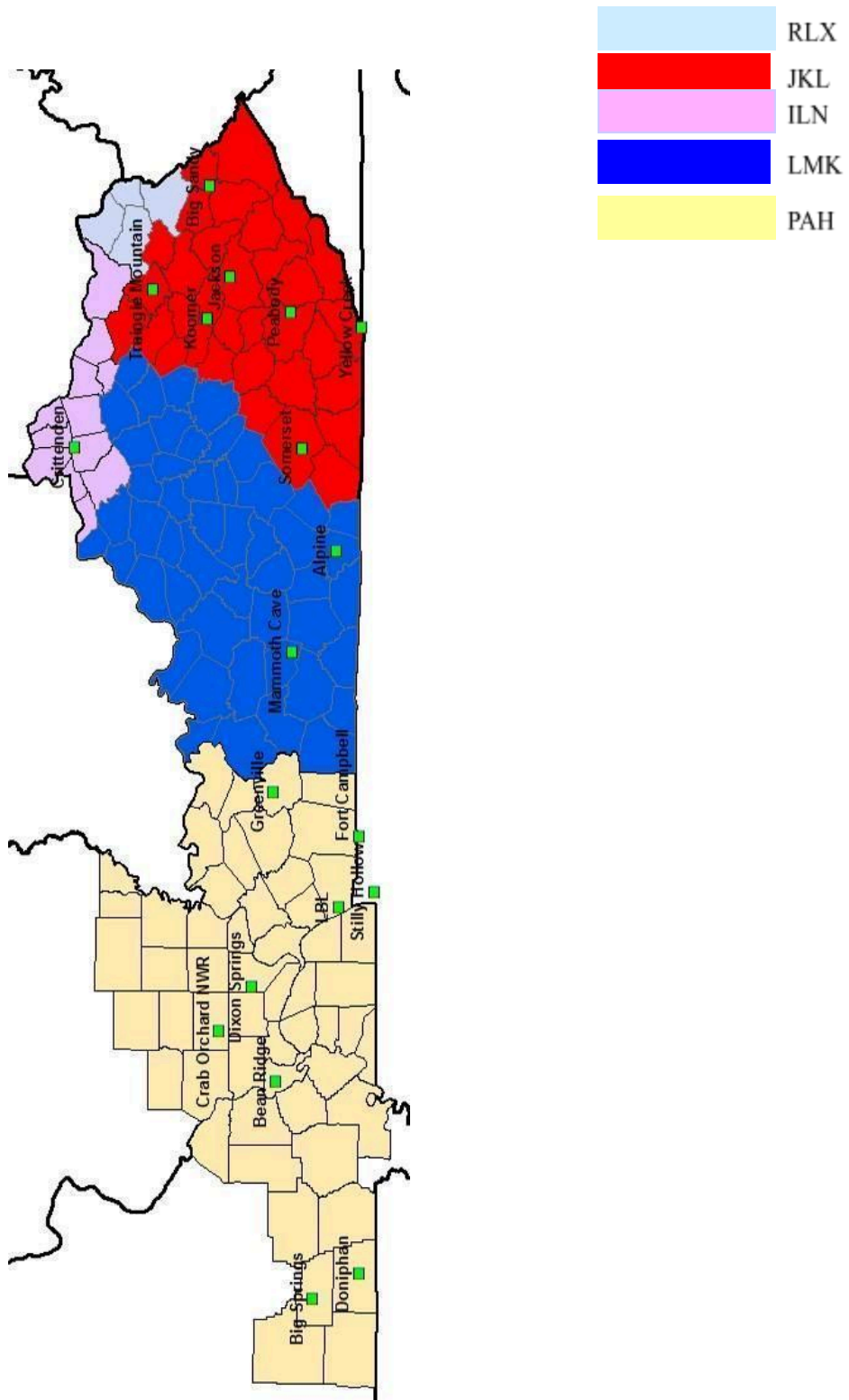
Appendix A: Kentucky Fire Weather Zones



Appendix B: CWA Fire Weather Forecast Areas



Appendix C: Fire Weather Observation Sites Map



Appendix D: Fire Weather Observation Sites Table

Name	CWA	Station ID	County	Elev. (ft)	Lat.	Lon.
Crittenden	ILN	150703	Grant, KY	935	38.7692	-84.6019
Big Sandy	JKL	154801	Martin, KY	1180	37.7500	-82.6333
Peabody	JKL	157201	Clay, KY	1465	37.1381	-83.5797
Jackson	JKL	156001	Breathitt, KY	1388	37.5922	-83.3178
Koomer Ridge	JKL	154401	Wolfe, KY	1300	37.7689	-83.6333
Somerset	JKL	157002	Pulaski, KY	927	37.0556	-84.6150
Triangle Mountain	JKL	152001	Rowan, KY	1360	38.1750	-83.4083
Yellow Creek	JKL	159801	Bell, KY	1090	36.6036	-83.6961
Alpine	LMK	189501	Cumberland, KY	853	36.7956	-85.3803
Mammoth Cave	LMK	156502	Edmonson, KY	774	37.1317	-86.1481
Bean Ridge	PAH	119701	Alexander, IL	700	37.2486	-89.3786
Big Springs	PAH	239004	Carter, MO	632	36.9750	-91.0181
Crab Orchard NWR	PAH	119001	Williamson, IL	450	37.6792	-89.0028
Dixon Springs	PAH	119501	Pope, IL	540	37.4367	-88.6672
Doniphan	PAH	239102	Ripley, MO	635	36.6269	-90.8239
Greenville	PAH	151191	Muhlenberg, KY	552	37.2672	-87.2028
Fort Campbell	OHX	400201	Montgomery, TN	545	36.6256	-87.5369
LBL/Golden Pond	PAH	159901	Trigg, KY	649	36.7764	-88.0631
Stilly Hollow	OHX	400101	Stewart, TN	580	36.5128	-87.9511

Appendix E: Format of the Tabular Fire Weather Planning Forecast.

Format shown is for the afternoon issuance; morning issuance is identical except for three periods instead of four. **Bold text** denotes required elements.

FNUS5i KNNN DDHHMM
FWFNNN

FIRE WEATHER PLANNING FORECAST FOR name of area
NATIONAL WEATHER SERVICE CITY STATE
TIME-DATE (example: 300 PM EST TUE JAN 1 2014)

...HEADLINE... (REQUIRED for Red Flag Warnings and Fire Weather
Watches...significant feature(s) at other times recommended)

.DISCUSSION...(concise, clear, non-technical explanation of the
current/forecasted fire weather)

SSZXXX-XXX>XXX-DDHHMM- (UGC/FIPS coding)
GEOGRAPHIC DESCRIPTORS (such as land management units, political boundaries,
geographic features, and/or fire weather zones)
TIME-DATE (repeated)

...RED FLAG WARNING/FIRE WEATHER WATCH HEADLINE (as needed in each appropriate
zone grouping) ...

PARAMETER	TONIGHT	TOMORROW	TOMORROW	FOLLOWING
	NIGHT DAY			
CLLOUD COVER	(CLOUDY, MCLDY, PCLDY, CLEAR)			
CHANCE PRECIP (%)	(Percent chance precip 0-100 or areal coverage)			
PRECIP TYPE	(NONE, DRIZL, FRZ RAIN, SNOW/RAIN, RAIN, TSHWR)			
TEMP (24H TREND)	(Max/min temps as zone avg or extremes, trend not included in 3 rd or 4 th period PM forecasts)			
RH % (24H TREND)	(Max/min relative humidity as zone avg or extremes, trend not included in 3 rd or 4 th period PM forecasts)			
20FT WND MPH (VALLEY/AM)	(8 pt compass or upslope/downslope and MPH w/ gusts, can be VALLEY or AM wind)			
20FT WND MPH (RIDGE/PM)	(8 pt compass and MPH w/gusts, can be PM or ridge top winds)			
PRECIP DURATION	(Hours of precip in period)			
PRECIP BEGIN	(Onset of precip probability)			
PRECIP END	(Cessation of precip probability)			
PRECIP AMOUNT	(Zone avg QPF inches)			
LAL	(Lightning Activity Level)			
HAINES INDEX (LOW)	(As applicable)			
HAINES INDEX (MID)	(As applicable)			
HAINES INDEX (HIGH)	(As applicable)			
MIXING HGT (AGL/MSL)	(Feet or meters)			
TRANSPORT WIND(KTS)	(8 pt compass)			
VENT RATE (KT-FT)	(Mixing height times transport wind)			
DISPERSION	(Locally defined category, e.g. GOOD)			
SUNSHINE HOURS	(Total hours of sun)			
(OTHER LCL OPTIONS)	??? ???			
REMARKS...	APPROPRIATE REMARKS TO ADD VALUE AND MARK SIGNIFICANT WEATHER CHANGES. INSERT 'NONE' IF NONE.			
	(.Extended forecast may optionally be provided for each zone segment)			

\$\$

[Forecast for next geographical descriptor and fire weather zone group]

\$\$

.EXTENDED... (wind required days 3-5, days 6 and 7 if appropriate; other elements per locally-established policy; days 3-7 may be grouped in any combination; may be in each zone segment versus this location; may optionally be presented as 12 hour periods)

.DAY 3...

.DAY 4...

.DAY 5...

.DAY 6... (days 6 and 7 optional)

.DAY 7...

.OUTLOOK (per local-established policy - Days 8-14, 30 and 90 day outlooks when issued)

\$\$

Appendix F: Example Format for Spot Forecasts

FNUS7i KXXX DDHHMM
FWSXXX

SPOT FORECAST FOR (location or name of burn)
NATIONAL WEATHER SERVICE (CITY STATE)
TIME-DATE (800 AM MST TUE NOV 27 2001)

IF CONDITIONS BECOME UNREPRESENTATIVE...CONTACT THE NATIONAL WEATHER SERVICE.

...HEADLINE...(if a fire weather watch or red flag warning is in effect, a headline is required - otherwise, a headline is recommended for every issuance.)

.DISCUSSION...(required)

.FIRST PERIOD...

SKY/WEATHER.....
TEMPERATURE.....
HUMIDITY.....
WIND.....(specify the wind level)
OPTIONAL ELEMENTS...(as requested by the users)

.SECOND PERIOD...

SKY/WEATHER.....
TEMPERATURE.....
HUMIDITY.....
WIND.....(specify the wind level)
OPTIONAL ELEMENTS...(as requested by the users)

.THIRD PERIOD...

SKY/WEATHER.....
TEMPERATURE.....
HUMIDITY.....
WIND.....(specify the wind level)
OPTIONAL ELEMENTS...(as requested by the users)

(OPTIONAL TABULAR INFORMATION)

.FIRST PERIOD...
TIME (LST or LDT) (time step) (time step) (time step) (time step)

ELEMENT #1.....
ELEMENT #2.....
ELEMENT #3.....
(other optional elements as requested by the users)

.SECOND PERIOD...
TIME (LST or LDT) (time step) (time step) (time step) (time step)

ELEMENT #1.....

```
ELEMENT #2.....
ELEMENT #3.....
(other optional elements as requested by the users)

.THIRD PERIOD...
TIME (LST or LDT) (time step) (time step) (time step) (time step)
-----
ELEMENT #1.....
ELEMENT #2.....
ELEMENT #3.....
(other optional elements as requested by the users)

FORECASTER...(optional)

$$
REQUESTING OFFICIAL...(name of requester)
REASON FOR REQUEST...(reason for request)
```

Appendix G: Red Flag Warning/Fire Weather Watch Format

WWUS8i KNNN DDHHMM
RFWNNN
URGENT – FIRE WEATHER MESSAGE
NATIONAL WEATHER SERVICE CITY STATE
TIME-DATE (example: 830 CDT WED SEP 1 2009)

...OVERVIEW HEADLINE/S (optional)...

.(optional overview discussion, focus on adverse weather conditions)

SSZXXX-XXX>XXX-DDHHMM- (UGC coding)
/<VTEC CODING>
GEOGRAPHICAL DESCRIPTORS (including land management governing units, fire weather zone numbers,
and/or county names)
TIME-DATE (example: 0830 CDT WED SEP 1, 2009)

...SEGMENT HEADLINE (Red Flag Warning or Fire Weather Watch, when, why, and where)...

Repeat of contents of the headline.

STATEMENT BODY (Discussion/details of weather parameters and systems affecting
the area)

PRECAUTIONARY/PREPAREDNESS ACTIONS...(Call to Action, definition of a
Fire Weather Watch or Red Flag
Warning)

\$\$

[next segment if necessary]

\$\$

Appendix H: FWM Example

FNUS83 KJKL 102106
FWMJKL

FCST,152001,191211,13,0,36,43,1,1,WSW,08,,36,23,78,43,0,0,N
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FCST,154801,191215,13,2,38,62,1,1,W,07,,48,32,92,62,0,0,N
FCST,154801,191216,13,2,40,62,1,1,E,02,,41,30,85,50,0,0,N
FCST,154801,191217,13,2,42,79,1,1,W,05,,42,34,96,59,0,0,N

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Appendix I: Hazardous Weather Outlook Example

Hazardous Weather Outlook
National Weather Service Jackson, KY
600 AM EDT Wed April 21 2014

This hazardous weather outlook is for portions of eastern Kentucky.

.DAY ONE...Today and Tonight.

Southwest winds increasing to 10 to 20 mph with higher gusts along with afternoon relative humidity readings dropping to 25 to 30 percent will combine to produce an increased threat of wildfires across the region today. Those planning outdoor burning projects today should take extra precautions to prevent the occurrence of uncontrolled grass fires.

.DAYS TWO THROUGH SEVEN...Thursday through Tuesday.

No hazardous weather is expected at this time.

.SPOTTER INFORMATION STATEMENT...

Spotter activation is not anticipated.

Appendix J: WS Form D-1

WS FORM D-1 (1-2005) (Supersedes Previous Editions)		SPOT REQUEST (See reverse for instructions)			U.S. Department of Commerce NOAA National Weather Service		
Please call the NWS Weather Forecast Office (WFO) when submitting a request and also after you receive a forecast to ensure request and forecast were received. Please provide feedback to WFO on forecast.							
1. Time†		2. Date		3. Name of Incident or Project		4. Requesting Agency	
5. Requesting Official		6. Phone Number		7. Fax Number		8. Contact Person	
9. Ignition/Incident Time and Date		12. Reason for Spot Request (choose one only) <input type="radio"/> Wildfire <input type="radio"/> Non-Wildfire Under the Interagency Agreement for Meteorological Services (USFS, BLM, NPS, USFWS, BIA) <input type="radio"/> Non-Wildfire State, tribal or local fire agency working in coordination with a federal participant in the Interagency Agreement for Meteorological Services <input type="radio"/> Non-Wildfire Essential to public safety, e.g. due to the proximity of population centers or critical infrastructure.			13. Latitude/Longitude:		
10. Size (Acres)					14. Elevation (ft, Mean Sea Level) Top: _____ Bottom: _____		
11. Type of Incident <input type="radio"/> Wildfire <input type="radio"/> Prescribed Fire <input type="radio"/> Wildland Fire Use (WFO) <input type="radio"/> HAZMAT <input type="radio"/> Search <u>And</u> Rescue (SAR)					15. Drainage		
					16. Aspect		17. Sheltering <input type="radio"/> Full <input type="radio"/> Partial <input type="radio"/> Unsheltered
18. Fuel Type: ___ Grass ___ <u>Brush</u> ___ Timber ___ Slash ___ Grass/Timber Understory ___ Other _____ Fuel Model: 1,2,3 4,5,6,7 8,9,10 11,12,13 2,5,8							
19. Location and name of nearest weather observing station (distance & direction from project):							
20. Weather Observations from project or nearby station(s): (Winds should be in compass direction e.g. N, NW, etc.)							
Place	Elevation	†Ob Time	20 ft. Wind Dir Speed	Eye Level Wind. Dir Speed	Temp. Dry Wet	Moisture RH DP	Remarks (Relevant Weather, etc)
24. Send Forecast to: ATTN:		25. Location:			26. Phone Number: Fax Number:		
27. Remarks (Special requests, incident details, Smoke Dispersion elements needed, etc.):							
EXPLANATION OF SYMBOLS: † Use 24-hour clock to indicate time. Example: 10:15 p.m. = 2215; 10:15 a.m. = 1015 Indicate local standard time or local daylight time							

WS FORM D-1

WS FORM D-1, January 2005 INSTRUCTIONS:

I. Incident Personnel:

1. Complete items 1 through 27 where applicable.

a. Example of weather conditions on site:

13. Weather Observations from project or nearby station(s):											
Place	Elevation	†Ob Time	20 ft. Wind		Eye Level Wind.		Temp.		Moisture		Remarks (Relevant Weather, etc.)
			Dir	Speed	Dir	Speed	Dry	Wet	RH	DP	
Unit G-50	1530'	0830	NW	6-8	NW	3-5	32		72		Observations from unit RAWS station, 50% cloud cover.

b. If the incident (HAZMAT, SAR) involves marine, put the wave/swell height and direction in the Remarks section.

2. Transmit in numerical sequence or fax to the appropriate Weather Forecast Office. (A weather forecaster on duty will complete the special forecast as quickly as possible and transmit the forecast and outlook to you by the method requested)
3. Retain completed copy for your records.
4. **Provide feedback to NWS utilizing separate page.** Be sure to include a copy of the spot forecast with any feedback submission including forecaster's name. Feedback to NWS personnel is imperative to assist with future forecasts. Remember, feedback on correct forecasts is equally as valuable as feedback on incorrect forecasts! If spot forecast is significantly different than conditions on site, a second forecast may be required.

II. ALL RELAY POINTS should use this form to insure completeness of date and forecast. A supply of this form should be kept by each dispatcher and all others who may be relaying requests for forecasts or relaying completed forecasts to field units.

III. Forms are available from your local National Weather Service Weather Forecast Office. They may also be reproduced by other agencies as needed, entering the phone number and radio identification if desired.

NOTICE: Information provided on this form may be used by the National Weather Service for official purposes in any way, including public release and publication in NWS products. False statements on this form may be subject to prosecution under the False Statement Accountability Act of 1996 (18 U.S.C. § 1001) or other statutes.

Appendix K: Requesting a HYSPLIT Run on NWS SPOT

How to request:

To request a HYSPLIT run for your prescribed fire or incident:

1. On the second page of the Spot Request form is a NOAA Hysplit Model box.
2. Select yes (the default is no) for the NOAA Hysplit Trajectory Model output to be sent to the email address that has been provided earlier on the form. If the plume model output is also needed, please contact the appropriate NWS office.

Notes: The HYSPLIT trajectory raw data, as well as .gif and .kml files will be sent to the specified email address.

How to interpret the results:

Plotted output concentrations (the output graphics) are calculated using a default concentration and a default emission rate. These two parameters tell the model how much smoke to release, and how fast to release it. The default concentration rate will always be 1 unit of mass per cubic meter (for example 1g/m³). The default emission rate will always be one mass unit per hour (for example, 1g/hour).

Since the output graphics use a default concentration and a default emission rate, the raw HYSPLIT smoke concentration shown on the output graphics do not represent actual concentrations and cannot be used to estimate health impacts. If the actual emission rate of smoke per hour is known you can perform a simple calculation to obtain actual concentrations:

$$\text{Actual concentrations} = \text{actual emission rate} \times \text{output concentrations}$$

An example of the Output is shown in the image below:

