

Fire Weather Services for Central North Carolina

Operating Plan

**NWS Raleigh, North Carolina
Revised January 2003**

**Operating Plan for Fire Weather
Services
for
Central North Carolina**

January 2003

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National Oceanic and Atmospheric Administration
National Weather Service
Raleigh, North Carolina**

I. Introduction

Weather support for forestry operations in North Carolina was traditionally provided by the National Weather Service Forecast Office in Raleigh. This changed in 1999-2000 as the National Weather Service continued with its modernization and associated restructuring (MAR). Beginning in January 2000, weather forecasts were no longer tied to state boundaries. Instead, forecast areas are now defined by the coverage of each of the 119 WSR-88D Doppler Radars associated with a Weather Forecast Office (WFO). The forecast areas for each office are defined by their county warning area (CWA). This will affect the land management agencies that use these forecasts. For a map of NWS offices throughout that have CWA's in North Carolina, see figure 1.

Spot weather forecast responsibilities were also split among respective surrounding National Weather Service Forecast offices depending on the county warning area of each office. The offices that have spot forecast responsibility in North Carolina include:

Blacksburg VA, Greenville-Spartanburg SC, Morristown TN, Raleigh NC, Wilmington NC, Wakefield VA and Newport NC. Routine daily forecasts and forecasts of Red Flag events will be the responsibility of each individual office.

I.1 Purpose

This Operating Plan is issued in lieu of a formal local Memorandum of Understanding (MOU) between the National Weather Service in Raleigh and the federal, state and local land management agencies that rely on weather support for day to day and emergency operations in central North Carolina. This plan will outline NWS operations and services available to users. This includes products and formats, dissemination and coordination, and the responsibilities of the users.

I.2 Objective

The Fire Weather Program at NWS Raleigh provides weather support to federal land management agencies for use in wildfire suppression, fire pre-suppression activities, smoke management, and planning and training related to these functions. The goal of this support is the protection of life and property as well as the reduction of the loss of natural resources caused by the adverse impact of weather on fire behavior.

This Operating Plan for Fire Weather Services conforms with the National Agreement for Meteorological Services in Support of Agencies with Land Management and Fire Protection Responsibilities, concluded in March 1983 (see Appendix A).

This Operating Plan will outline fire weather procedures and cooperation between the following agencies:

NWS Forecast Office, Raleigh, N.C.
United States Department of Agricultural Forest Service
National Park Service
North Carolina Forest Service

I.3 Partners

Partners shall be defined as any person, group, agency or body which uses the products and services provided by the National Weather Service in support of fire suppression operations.

The following additional non-fire suppression support may be provided to federal entities:

...spot forecasts for prescribed burns

...spot forecast for non-fire forecast management activities.

...transport and stability forecasts for smoke management

...consultation and liaison for non-wildfire activities

...and land management forecasts issued outside federal fire services.

II. Organization.

II.1 National Weather Service Headquarters

NWS Headquarters is located in Silver Spring, Maryland. It is responsible for establishing policies and coordinating the National Fire Weather Program. The National Fire Weather Program manager coordinates the program with the regional program managers. The national program manager also works with the National Headquarters of the Federal Forestry and Land Management agencies and the Association of State Foresters in determining overall forestry and

land management requirements for meteorological support. The national program manager coordinates national training in forestry and fire weather for NWS forecasters.

II.2 National Weather Service Regional Headquarters

Regional Headquarters manage the technical operations of the fire weather program within each region. They also provide guidance and assistance to meteorologists-in-charge (MIC) on program operations and problems through the Regional Operational Manual Letters (ROMLS) 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.

II.3 Weather Forecast Office (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). All offices have a Fire Weather Program Leader.

II.3.1 Meteorologist-in Charge (MIC)

The Meteorologist-in-Charge is responsible for the provision of adequate forestry and fire weather services for the offices's area of warning and forecast responsibility. The MIC will ensure that the focal point or program leader is provided adequate time for user liaison activities.

II.3.2. Fire Weather Focal Point (FP)

Fire weather focal points are customer service representatives for the program. Acting as the representative of the MIC, the FP will be in regular contact with land management agencies to help them assess meteorological needs, to inform them of NWS products and services available to meet these needs, and to educate them in the most effective use of the various NWS products and resources, including NOAA Weather Radio (NWR). Program leaders will work with the users to advise them in utilizing existing NWS products and services produced for other programs that could meet the requirements of wildland management. The program leaders are also tasked with ensuring WFO staff meteorologists are trained and maintain proficiency in preparing forecast products in support of the fire weather program.

WFO Raleigh, N.C. will provide the services 24 hours a day, 365 days a year. WFO Raleigh can

be reached at the following address and telephone numbers:

National Weather Service at Raleigh address:

*National Weather Service
1005 Capability Drive, Suite 300
Centennial Campus, North Carolina State University
Raleigh, N.C. 27606*

Main Contacts:

*Steve Harned, Meteorologist in Charge
Phillip Badgett, Fire Weather Focal Point*

Telephone numbers:

(XXX) XXX-XXXX (forecast questions and spot forecasts)

(XXX) XXX-XXXX (general questions or concerns)

(XXX) XXX-XXXX (to report severe weather)

(XXX) XXX-XXXX (fax)

***Note: These phone numbers are unlisted coordination numbers and should not be released to anyone other than persons or agencies that have a legitimate fire weather concern.*

Internet address: <http://www.nws.noaa.gov/er/rah/>

Regional Fire Weather Program Leader:

Harvey Thurm (XXX) XXX-XXXX

*Eastern Region Headquarters
Airport Corporate Center*

***630 Johnson Avenue
Bohemia, NY 11716***

III. Operational program and services provided by WFO Raleigh

III.1 Fire Weather Forecast Area

WFO Raleigh serves central and parts of eastern North Carolina. A map of the area for which the WFO Raleigh will issue Fire Weather Forecasts can be viewed in figure 1.

The counties covered by WFO Raleigh, NC include:

In the Piedmont... Person, Granville, Vance, Warren, Forsyth, Guilford, Alamance, Orange, Durham, Wake, Franklin, Davidson, Randolph, Chatham, Stanly, Montgomery, and Anson.

In the Sandhills... Moore, Lee, Harnett, Richmond, Scotland, Hoke, and Cumberland.

In the Coastal Plain... Halifax, Nash, Edgecombe, Wilson, Johnston, Wayne, and Sampson.

National Forests and Parks Served by WFO Raleigh include:

Uwharrie National Forest in Montgomery and Randolph counties.

Pee Dee National Wildlife Refuge in Anson county.

III.2 Fire Weather Season

Traditionally, the fire weather season is split into two distinct parts (early spring and fall). The spring fire weather season extends from March into May (until green up conditions are complete). The fall fire weather season occurs during the climatologically dry fall months (the period as the leaves fall from the trees until shortly after the first freeze of the season). However, pre-suppression fire weather forecasts will be prepared year round by WFO Raleigh NC.

Wildfires can occur in the Raleigh CWA at any time. As a result, the fire weather forecast will be issued year round.

III.3 Fire Weather Forecast issuance/dissemination and updates by WFO Raleigh

The NWS issues two types of fire weather forecasts: pre-suppression forecasts (or routine or daily forecasts) and spot (or site specific) forecasts. The ***routine fire weather forecasts will be issued twice a day. The transmission window is between 830 A.M. and 900 A.M. EST (730 A.M. and 800 A.M. EDT) and between 300 P.M. and 400 P.M. EST and EDT.***

Updates are issued at any time at the forecaster's discretion. However, ***updates shall be mandatory if ANY of the following conditions occur:***

- 1. Red Flag conditions are observed or anticipated and no red flag warning is currently in effect. (See section III.5 on red flag criteria).*
- 2. Standard Air Temperature. Accuracy required, + or - 5 degrees Fahrenheit.*
- 3. Relative Humidity values, observed or anticipated, are + or - 5 percent from the forecast values when the relative humidity is 35 percent or below. Relative humidity values, observed or anticipated, are plus or minus 10 percent from forecast values when the relative humidity is greater than 35 percent.*
- 4. Wind speed and direction at 20 feet above ground level (AGL) is + or - 5 mph from the forecast and/or direction is in error by + or - 45 degrees.*
- 5. A change in burn category or smoke dispersion category is observed or anticipated.*
- 6. Precipitation. Probability of precipitation and conditional probability of precipitation, duration, (hours), amount (categories), and type for each fire weather zone. Accuracy requirements are the same as those for the public zones.*
- 7. Weather/Sky. Accuracy requirements are the same as those for the public zones.*

If a forecast update should occur under any of these mandatory update conditions, the update shall be followed up with a call to the North Carolina Forecast Service. The contact points for the NCFS are Bill Miller, Dave Jarman, Carl Johnson, or Louise Coats. The phone number is (919) 733-2162 extension 237.

The backup for the NCFS is the United States Forest Service office in Asheville. The

contact points for the USFS are Mike Maguire and Doug Francis. The phone number is (828) 257-4804.

The primary means by which users shall access the pre-suppression forecast is through the Weather Information Management System (WIMS). The forecasts are also available on the Internet.

Important Telephone numbers...

NCFE phone number (XXX) XXX-XXXX extension xxx

USFS phone number (XXX) XXX-XXXX

III.3.1 Pre-Suppression Forecast Content

Again, the pre-suppression forecast is a general forecast issued twice daily. The forecast is divided either into district, climatologically homogenous zones, or fire district. The forecast is used for day-to-day planning of land management operations and for determining general weather trends which might impact fire behavior.

The basic philosophy of the daily pre-suppression forecasts will be to forecast, as accurately as possible, weather conditions during the forecast period as it pertains to fire management. Individual forecast parameters will be chosen to represent the hottest, driest, and windiest conditions near the main population centers in the forecast zone which may directly lead to an increase in fire activity or new fire starts. As a result, this may lead to subtle forecast differences between the fire forecast and the public zone forecasts.

Local variations in humidity, slope, wind, temperature, and available fuels can lead to major differences between the general fire forecast and the observed conditions. In these cases, a fire manager should request a site-specific or spot forecast.

The pre-suppression forecast may contain forecast values for any or all of the following weather elements: sky conditions; maximum and minimum temperatures; minimum and maximum relative humidity values; wind speed and direction; probability of precipitation; precipitation type, duration and amount; mixing heights; transport wind; inversion height; inversion onset and burn off times; ventilation and smoke management levels; wind profiles; stability indices (IE., Haines Index) and lightning activity levels (LAL).

An example of the routine fire weather forecast is located in Appendix B.

Routine fire weather forecasts will be divided into four main sections.

In the ***first*** section, the ***synopsis and headlines*** will highlight the major weather features affecting the area for the next 12 to 24 hours. For example, if strong winds or low relative humidities are forecast, they should be highlighted in the synopsis and included in a headline. ***Headlines*** are encouraged because it brings immediate attention to the users. Included in headlines would be a Red Flag Watch or Warning, a forecast of strong wind, low relative humidities, very high temperatures, or a combination thereof.

Part ***two*** of the fire weather forecast will be the ***specific zone forecasts***. The zones will cover the “Today”, “Tonight”, and “Tomorrow” period in the A.M. issuance and the “Tonight” and “Tomorrow” period in the P.M. issuance.

In an individual zone section, the following details and parameters will be forecast:

Red Flag Watch or Warning Headline (when needed)

High Wind Watch or Warning or Advisory Headline (when needed).

When mentioned in the public zone forecasts, these will be included as headlines in the fire zones.

Cloud Amount. ***The prevailing sky cover across the forecast zone in the specific period.***

Chance of Precipitation. ***The POP is the percent probability that any one location across the forecast zone will receive measurable precipitation (0.01 of an inch). This percentage should be rounded to the nearest 10 percent. In some cases, as with a general rain situation, the percentage will represent the probability of precipitation from a weather disturbance at any one spot within the zone. In other cases, as in the summertime convective season, the value can be thought of as the expected areal coverage of precipitation across the zone. Often it is a combination of both point probability and areal coverage.***

Drizzle and snow flurries are not considered measurable precipitation events and thus are given no probability.

Precipitation Type. ***Character of any forecast precipitation.***

Maximum/Minimum Temperatures. *The free air dry bulb temperature as measured at a standard 4.5 feet above ground level. During daylight periods, a specific, representative maximum temperature for the forecast zone will be provided. At night, a forecast minimum will be provided. Units are in degrees Fahrenheit.*

Wind Direction. *The direction will be the one from which the prevailing wind is blowing, using the eight cardinal direction points. A two minute average forecast at 20 feet above ground level (or above the vegetative cover) will be used.*

Wind Speed. *The speed forecast will be the maximum probable sustained wind speed across the forecast area at any time during the forecast period. The wind forecast will be a two-minute average forecast at 20 feet above ground level. Units are in miles an hour (MPH). For wind gusts, which are rapid fluctuations in wind speed of usually less than 30 seconds duration, use the forecast for the highest probable gusts preceded by a G.*

Example: 20G30 or 08G18.

Precipitation Amount. *When the probability of measurable precipitation is greater than or equal to 50 percent, a forecast of the amount of precipitation (use liquid equivalent if frozen or freezing) will be included. Amounts are given in tenths of an inch.*

Precipitation Duration. *The expected duration of precipitation in hours. (Again, omitted if the POP is less than 50).*

Lightning Frequency and Haines Index- *OMIT*

Relative Humidity. *The RH as computed from measurements at 4.5 feet above ground level. The RH will be given as the minimum humidity value during the day and the maximum value during the night.*

Mixing Height. *This value is site-specific. This is defined as the atmospheric limit above which vigorous vertical mixing does not take place. It provides the potential for the atmosphere to disperse smoke. In general, a mixing height of 2000 feet or less should deter a prescribed burn and may cause a call to the Raleigh Forecast Office.*

Transport Direction. *This value is site-specific. It is the average wind direction from the surface to the top of the mixing level. Soundings and local VAD from the WSR-88D are used to determine the average direction in the layer. The direction of the transport wind (from where it is blowing) will be given.*

Transport Speed. *It is the average wind speed from the surface to the top of the mixing layer. The speed will be given in miles an hour (MPH).*

Burn Category. *This is the forecast of the maximum afternoon mixing height (in feet above ground level) and the average transport wind (in MPH). The product of these two values, known as the ventilation, will be expressed as the burn category for the day. Use the conversion table provided at the Fire Weather Desk or in the SDM to compute the appropriate category given the mixing height and transport wind speed. Remember, a category one is almost never used and will definitely prompt calls from the forestry folks. The air mass would be stagnant. See Figure 2 for Burn Category table.*

Daytime Burn Category Forecasts are defined as follows:

<i>Category.....</i>	<i>Weather Event.....</i>	<i>Recommendation</i>
<i>1</i>	<i>Low level temperature inversion and stagnant air the entire day..</i>	<i>No burning.</i>
<i>2</i>	<i>Inversion until early afternoon and very light transport wind</i>	<i>Mid-afternoon burning only.</i>
<i>3</i>	<i>Inversion until late morning. Light transport wind.</i>	<i>Daytime burning only but not until inversion burn off temperature is reached.</i>
<i>4.</i>	<i>Little or no inversion. Moderate transport wind.</i>	<i>Burning anytime.</i>
<i>5.</i>	<i>No inversions. Strong gusty transport wind.</i>	<i>Burning with caution. Good smoke dispersion but adverse fire behavior.</i>

Smoke Dispersion (night). *Will a surface inversion form during the evening? If so, how soon after sundown? If it is expected to form rapidly after sundown, forecast a very poor smoke dispersion. If it is expected to form gradually, a few hours after sundown, use poor. If the inversion is not expected until late at night or no inversion is expected with light to moderate transport wind, use fair. If no inversion is forecast and moderate to strong and gusty transport winds are expected, use good. Use the following table for quick reference.*

Quick look table for Smoke Dispersion Outlook.

Nighttime Dispersion Forecasts are defined as follows:

<i>Forecast.....</i>	<i>Weather Event.....</i>	<i>Recommendation</i>
<i>Stagnant</i>	<i>Low level temperature inversion and stagnant air at night..</i>	<i>No burning.</i>
<i>Very Poor</i>	<i>Rapid inversion set up at sunset very light or calm wind.</i>	<i>Terminate burning in the late afternoon to allow smoke dispersal before sunset.</i>
<i>Poor</i>	<i>Gradual inversion set up overnight. Light wind.</i>	<i>Terminate burning around dusk or shortly after sunset.</i>
<i>Fair</i>	<i>Weak or no inversion set up overnight. Light to moderate wind.</i>	<i>Burning anytime.</i>
<i>Good</i>	<i>No inversion. Moderate to strong and gusty wind.</i>	<i>Burn with caution. Possible adverse fire behavior.</i>

Wind Speed Profile and Stability

It is widely recognized that the profile of the wind speed with altitude on an active fire day is an important factor in fire behavior. Certain profiles of wind speed marked by decreasing speed above a wind maximum (or jet) within 1500 feet of the surface can cause fires to behave erratically when combined with a rapid decrease in air temperature with altitude on the order of 5.5 degrees Fahrenheit per 1000 feet, a common occurrence on a sunny afternoon. Appendix D contains the various types of wind profiles that contribute toward adverse fire behavior. Appendix D2 is a blank wind profile analysis chart for sketching a quick profile.

During the peak fire weather seasons, on days in which fire activity is expected to be at or above normal, an analysis of wind speed profile will be provided in the fire weather pre-suppression forecasts.

The analysis will state whether the profile is Favorable, Questionable, or Unfavorable for fire control. If Favorable, no additional information will need to be provided. If Unfavorable, a profile type from Appendix D will be used to describe the wind profile along with detailed information on maximum wind speed, direction, and height AGL. If Questionable, additional analysis will be done after the forecast is issued and a forecast update message will be sent when it is determined that the profile is Favorable or Unfavorable. This will usually be within one to two hours of the

forecast issuance time.

The *third section* of the forecast is the *extended forecast*. This will be a general overview of expected weather conditions starting at the end of the “tomorrow” forecast and progressing through day 5. This forecast will highlight temperature ranges, sky condition, and precipitation forecasts. Please try to tailor the extended forecast after the public zone forecasts for each zone.

The *forth and last section* of the Fire Weather Forecast is the 6 to 10 day and the 8 to 14 day outlooks. This section will only include a temperature and precipitation outlook for the periods indicated. These forecasts are pulled directly from NCEP’s discussion of the extended period. (PMDMRD).

The forecast that is included in our fire forecast will be pulled directly from the tabular forecast for North Carolina. A forecast is given with respect to seasonal normal values for the specific time of year. Please ensure that the forecast is the most recent forecast for our area. If not, please manually update to correct the information before sending the product.

III.4 Spot Forecast Issuance and Dissemination

Spot forecasts will be prepared at any time when requested by Federal Fire Control agencies. It is imperative to note that the forecast office can not provide Spot Forecasts for prescribed burns or any other non-wildfire to state or local government agencies or representatives. However, if the state or local governmental agency is working with the Federal Fire Control agency, a spot forecast can be provided.

Due to the detailed and specific nature of this forecast product, it is imperative that the user provide the forecaster with necessary and sufficient information so that a reliable forecast can be prepared.

III.4.1 Spot forecasts

Requests for spot forecasts can now be made by internet requests. Please follow the instructions on our Web Page.

Requests for spot forecasts can also be made by the Fire Weather Special Request Form, WS Form D-1 (see form 1). Section I of WS Form D-1 should be filled out as completely as possible by the user agency prior to submitting the request by fax to the forecast office. If the request is made by phone, all the information in Section I should be provided to the forecast office.

While there is no dedicated fire weather forecaster, the forecast office will give a high priority to spot forecasts in the absence of weather phenomena in the CWA that pose a threat to life and property. To ensure that the request for a spot forecast is handled properly and appropriately, user agencies should adhere to the following guidelines:

- 1. Allow adequate time for the forecaster to prepare the forecast. This will normally be between 10 and 20 minutes. On particularly busy fire weather days, spot forecasts will be handled on a first-come, first-served basis, with wildfires or other life threatening events taking the highest priority.***
- 2. Provide as much on-site or near-site weather information as possible. At a minimum, the user must provide at least one observation within an hour of the request. This observation must contain the following (as per WS Form D-1): location of observation; elevation at the observation site; time of the observation; wind direction; speed; and level (eye or 20 foot); dry and wet bulb temperatures; any remarks about the state of the weather, particularly anything that may affect fire behavior. If possible, include some observations from the previous day that might give the forecaster an indication of daily trends.***
- 3. As much as possible, specify the time period for which the forecast is needed.***
- 4. As much as possible, specify the weather elements of most importance for which a forecast is needed and/or critical values of these elements.***
- 5. Provide a contact point name and phone number where the forecaster can call back, if necessary. Also include a fax number for returning completed forecasts.***
- 6. In order to receive prompt attention for a fax request, please phone the office to let the forecaster know the request is on the way***

Note: Spot forecasts for wildfires covering thousands of acres should be accompanied by observations from multiple sites around the fire. This will help the forecaster to better assess the local weather effects. Spot forecast requests will be handled on a first-come, first-served basis, with wildfires taking the highest priority. See Example (Appendix E1-2).

III.4.2 Spot Forecast Content

The spot forecast is site specific, highly detailed and may contain any or all the following weather elements:

Sky condition, maximum and minimum temperatures, maximum and minimum relative humidity, wind speed and direction, probability of precipitation, precipitation type, duration and amount, mixing height, transport wind, inversion height, inversion onset and or burn off times, and quality of smoke dispersion.

It is especially important for the requesting agency to provide feedback to the forecaster on how the forecast is or is not working. The feedback, positive or negative, will assist the forecaster in subsequent forecasts for similar situations. Feedback can be provided by a call to the forecaster or by using the WS Form D-1. This form can be faxed to the Raleigh Weather Office.

III.5 NFDRS Point Forecasts

NFDRS point forecasts (FWM) are tailored for the hour that the next NFDRS observation will be taken. In other words, they are to forecast an observation at 1300 LST the next day. These forecasts become the observations that are used to calculate the danger ratings for the next day. Components of NFDRS that are calculated using the forecast are: Ignition component (IC), Spread component (SC), and Energy Release component (ERC).

The point forecasts are a forecast for individual NFDRS observation points. In the Raleigh CWA, there are five RAWS sites that individual in which NFDRS forecasts are made. These sites include: Lexington, Rockingham, Troy, Fort Bragg, and Duke Forest.

III.5.1 Point Forecast Content

(Please refer to appendix B-3 for detailed instructions for preparing our Point Forecasts).

The generation of Point Forecasts will be by an AWIPS application that runs from ICWF. The application initializes NFDRS forecasts with the RDF. This creates a “first guess”. The “first guess” will then be modified by the forecaster in a user-friendly environment.

The Point Forecast Content:

FCST, SSCC##, YYMMDD, HR,W,T,H,AL,TL,WD,WS,FM,TX,TN,HX, HN, PD1,PD2,WF

FCST, station or zone #, date, forecast hour (always 13), state of weather, temperature, relative humidity, LAL 1400 LST-2300 LST, LAL 2300 LST-2300 LST, wind direction (degrees), wind speed, 10 hour fuel moisture, maximum temperature, minimum temperature, maximum relative humidity, minimum relative humidity, precipitation 1400 LST-0500 LST, precipitation 0500 LST-1400 LST, wet flag.

Updates are required as with the regular pre-suppression guidelines.

III.6 Red Flag Criteria, Contents, and Procedures

A Red Flag Event occurs when critical weather conditions develop which could lead to extensive wildfire occurrences or to extreme fire behavior. Red Flag Events represent a threat to life and property and may adversely impact fire fighting personnel and resources. Critical weather conditions include combinations of the following: strong, gusty winds; very low relative humidity; highly unstable atmosphere; significant wind shifts; and lightning. Typically, these conditions must be coupled with very low fuel moisture values. An example of a Red Flag Warning can be found in Appendix F.

III.6.1 Red Flag Warning (RFW)

(Please refer to the Red Flag Checklist in Appendix F and the Red Flag Warning and Fire Weather Watch examples Appendix F1-2).

A Red Flag Warning shall be issued, after coordination with the appropriate land management agencies, when a Red Flag Event is occurring or is imminent. The warning shall be issued for all or a portion of the forecast area.

The RFW shall be issued immediately after it is coordinated with the NCFS or USFS. Otherwise, it shall be issued for impending Red Flag conditions when there is a high degree of confidence that conditions will develop within 24 hours. The warning will continue until the conditions cease to exist or fail to develop as forecast. At such time, the warning will be canceled.

Historically, the highest risk of significant fire starts and blow-ups have occurred when fuels are sufficiently dry before a dry cold front crosses the region (in late February through April... or until green-up completes). Another peak period has historically been from October into early December...until just after the leaf litter completes its cycle. Be especially cautious during these times of the year.

In an effort to simplify the Red Flag Warning process, forecasters at Raleigh should be concerned mainly with the specific weather conditions and critical weather patterns necessary to produce Red Flag conditions. Tracking the fuel moisture will be the responsibility of the fire product user agencies and can be obtained through coordination with the NCFS or USFS.

** As a result, coordination will be necessary with the North Carolina Forest Service when a forecaster considers a Red Flag Warning or Fire Weather Watch. Bottom line... coordinate your meteorological data with the Forest Service. But remember, the final call on the issuance of the RFW will be up to you, the meteorologist.

A Red Flag Warning will be considered when the following meteorological parameters are met:

The relative humidity is expected to fall to or below 25 percent at any time over the forecast area AND the sustained wind speed of at least 20 mph or greater AND/OR gusts at 30 mph or greater are forecast.

The other criteria in which a Red Flag Warning should be considered is when unstable conditions are forecast along with low relative humidities OR gusty wind. Generally, when the change in temperature between 700 and 850 MB is greater than 10 degrees celsius AND the change in temperature between 500 and 850 MB is greater than 26 degrees celsius, AND the surface to 850 MB is near adiabatic, then a Red Flag Warning should be considered and coordinated with the NCFS or USFS.

The coordination backup for the NCFS is the USFS. If the NCFS can not be reached at the operations number and none of the contacts are available by pager, then call the USFS for coordination.

III.6.2 Fire Weather Watch (RFW)

A Fire Weather Watch will be issued, after coordination with the appropriate land management agencies, to advise of the possible development of a Red Flag Event in the near future. It will be issued for all or part of the forecast area. A Fire Weather Watch is issued when the forecaster is reasonably confident that a Red Flag Event will occur. A Watch should be issued 12 to 36 hours in advance but shall not be issued more than 72 hours in advance of the expected onset of critical weather conditions. The watch will remain in effect until the forecaster determines that either the Red Flag Event will not develop or that the watch should be upgraded to a warning. If the conditions are not expected to occur as forecast, the watch will be canceled.

Bottom line: Coordination with the NCFS concerning the issuance of a Watch must be made prior to the issuance of the RFW.

IV. Special Fire Weather Services

Special fire weather services are those services that are uniquely required by land management agencies and go beyond the normal forecast operations of the NWS. Special services include Advanced Technology Meteorological Unit (ATMU) and Incident Meteorologist (IMET) deployment, station visits, weather observer training, participation in user agency training, and other pertinent meteorological services.

Typically, special services require NWS personnel to be away from the forecast office and to be in overtime status in some cases. User agencies are responsible for covering the cost of NWS overtime, travel, and per diem expenses. Reimbursement of costs for special services will be as outlined in the **National Agreement for Meteorological Services in Support of Agencies with Land Management and Fire Protection Responsibilities.**

IV.1 Advanced Technology Meteorological Unit (ATMU) Services

The ATMU is a modular and mobile system of equipment used by an IMET for data collection and product preparation. ATMUs are a national resource with 25 of them being cached around the country, mainly in the western states. The nearest cache to WFO Raleigh is London, Kentucky where two are maintained (see Appendix XX).

An ATMU consists of two modules. The first contains a theodolite with tripod and a calculator for computing winds aloft, two belt weather kits, weather balloons, a nozzle and regulator for a helium tank, office supplies, and miscellaneous expendables. It is 27.6 cubic feet and weighs a little over 200 pounds. The second module, known as the computer module, contains a laptop computer with a satellite docking station, a satellite dish for down linking weather data, and a printer. The computer module is 5 cubic feet and weighs 55 pounds. A third module, the microREMS, is a self-contained portable weather station with instruments for measuring temperature, dewpoint, and wind. It is powered by a solar panel and a battery, is 8.2 cubic feet, and weighs 125 pounds.

Requests for the ATMU, microREMS, and IMET should be made through the USDA Forest Service Region 8 Dispatch. The Meteorologist-in-Charge or the Fire Weather Program Leader at WFO Raleigh should also be notified of the request. Typically, the IMET nearest the incident will be deployed. In this case, the IMET at Raleigh would be deployed. (Note: not all NWS offices have a certified IMET. USDA FS Regions should have a list of available IMETs.) During times of limited resources, IMETs from other areas of the country may be called to fill the request.

The requesting agency is responsible for coordinating transportation of the ATMU and IMET to and from the incident. The requesting agency is also responsible for any storage of the unit while in transit and for shelter for the IMET and ATMU at the incident site. A sheltered work area, at least 50 square feet in area with a table and chair must be provided. The work area must be protected from excessive dust, free of standing water or condensation, and must be heated and/or cooled sufficiently to allow efficient operation of equipment. Power (120 V AC) is required for the ATMUs electrical equipment and priority telephone access during certain short periods each day must be made available.

Upon arrival at the incident and after going through the appropriate check-in procedures, the IMET will:

- 1. Brief the Fire Behavior Analyst (FBAN), Planning Section Chief (PSC), and the Incident Commander (IC) on the current and expected weather affecting the fire.*
- 2. Establish a schedule with the IC and FBAN for written forecasts and formal briefings.*
- 3. Request a briefing of the fire situation and potential behavior problems from the FBAN. As time and resources permit, incident management should arrange for an areal inspection trip of the fire by the IMET and should provide the forecaster with current*

fireline maps. If possible, the IMET should be assigned a radio with a fireline frequency.

4. In cooperation with the FBAN and PSC, arrange for a schedule of observations from key points around the fire and from nearby lookouts and fire danger stations. On large fires, some personnel (at least two) should be permanently assigned this duty. On smaller fires, this information can be provided by Division Supervisors equipped with belt weather kits.

IV.2 Fire Weather Training

NWS meteorologists will be available to assist in user oriented training, such as fire behavior training (S-390) and other weather related courses. Requests should be made through the Meteorologist-in-Charge as early as possible after the dates for such training have been determined.

IV.3 Other Special Services

Other special services include weather station visits by user agency personnel, weather observer training, and course development work. These activities would typically be at the full expense of the requesting agency unless other arrangements have been made.

V. Fire weather observations and other agency responsibilities

V.1 Fire Weather Observation Stations

Fire weather observation stations provide the specialized weather observations for fire weather forecasts, wildfire control and suppression, and various other land management operations. These stations were selected very carefully in each state and federal district. Sites were chosen to represent homogeneous conditions across a district. Stations may either be manned sites operated by land management agencies or unmanned Remote Automatic Weather Stations (RAWS), maintained by any of the federal or state land management agencies in the area.

All observation stations are assigned a 6-digit identification/location number. The first two digits indicate the state, the second two digits indicate the county, and the last two digits indicate the consecutively assigned station number for that county. The state two digit code for North Carolina is 31. Land managers who wish to have a number assigned to a station should contact the local NWS office. RAWS stations are also assigned an 8-character alphanumeric identifier based on satellite transmission time (the DCP number, issued by the National Environmental Satellite Service (NESS)). Observations from a RAWS site will be entered manually into the Weather Information Management System (WIMS) under the 8 character identifier but must be entered manually at 1400 LDT (1300 LST) under the 6 digit station number for the National Fire Danger Rating System (NFDRS) calculations.

V.2 Fire Weather Observation Quality Control

The fire weather program is a cooperative effort between the NWS and land management agencies. Accurate and timely weather information is one of the most important tools available to the land manager. Observations are the most important single effort that the control agencies put into the fire weather program. The observations entered into WIMS are direct input for the NFDRS output.

Observers should keep in mind that the weather observations they are taking are as much for their own use as for use by the NWS. For this reason, it is very important that the fire weather observers be adequately trained to provide consistently timely and representative observations. Every effort should be made to ensure the quality of the observations before the entry into WIMS. If an observation is known to be in error, it should not be entered into the system.

V.3. Training Personnel and Maintaining Sites

The responsibility for training observers is with the user agencies. If resources permit, the NWS will be available to assist when requested to do so. Any expenses incurred by the NWS will normally be charged to the user agency, unless other arrangements have been made.

The user agencies are also responsible for maintaining observation site equipment. NWS personnel may accompany the user on maintenance trips or for annual inspection visits which could also serve as liaison with the users.

V.4 Supplies

Most items for taking and recording observations will be furnished by the user agency. The NWS will furnish a few select forms and/or charts upon request.

VI. Communications

The primary means of communication used by the NWS is the Advanced Weather Interactive Processing System (AWIPS). Products transmitted by this means include Pre-Suppression Forecasts (FWF), Fire Weather Watches and Red Flag Warnings (RFW), and Point Forecasts (FWM).

Spot forecasts will be disseminated only to the requesting agency by means of telefax (FAX). Therefore, it is necessary for the requesting agency to supply a FAX number when asking for a spot forecast. A voice number should also be included in case problems are encountered with the fax transmission.

Other means of communication may be utilized upon mutual agreement with the user agencies.