

2008
Fire Weather
Operations Plan for
Central Kentucky
and Southern
Indiana

CONTENTS

Fire Weather Organizational Directory

Internet Directory

Introduction

New for Fall 2008

Forecast Area

Fire Season

Red Flag Forecast

Issuance Time of Normal Forecast

Content of Narrative Fire Weather Forecast

Individual Station Forecasts

Fire Weather Observations

Spot Forecasts

Methods of Communication

NOAA Weather Radio

**Mobile Unit Services/Incident Meteorologist
Request and Dispatch**

Fire Weather Station Visits

Training

FIRE WEATHER ORGANIZATIONAL DIRECTORY

National Weather Service, Louisville

6201 Theiler Lane
Louisville, KY 40229

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

Fire Weather Program Leader
Joe Ammerman (joseph.ammerman@noaa.gov)

INTERNET ACCESS

WFO Louisville, Kentucky

Internet Access:

<http://www.crh.noaa.gov/lmk/?n=fireweather>

INTRODUCTION

The National Weather Service's Fire Weather Program is designed to provide forecasts, warnings, and consultation services for the prevention, suppression, and management of forest and rangeland fires and for a host of land management activities. These meteorological services are built to meet the weather requirements of federal and state wild land managers.

The program is customer-oriented and is not limited to just wild fire management, but also includes all forest and range management weather support (such as prescribed burns and spot forecasts). Weather support is available throughout the year and not just during the normal fire season.

This Operations Plan will cover services provide by the Louisville, KY Weather Forecast Office. The plan covers how weather services can be requested, how they will be provided, and how compensation will be rendered if need be.

This plan will be reviewed annually by all parties. Any intermediate changes or amendments will be coordinated with all parties involved before the changes are incorporated.

New For 2008

No changes since the fall of 2007.

FORECAST AREA

The forecast area of responsibility for Louisville is shown in the Attachments link:

FIRE SEASON

The normal fire season will be broken into two separate periods. The spring fire season will run from February 15 through April 30. The fall fire season will begin on

October 1 and end December 15. These dates may be changed depending on the severity of the fire season.

ISSUANCE TIME OF NORMAL FORECASTS

During the fire season the narrative forecast will normally be issued by 500 AM Eastern Time and 330 PM Eastern time, seven days a week. During the rest of the year the narrative forecast will be issued once around 500 AM. The point forecast will be issued by 330 PM Eastern Time. Examples of narrative and point forecasts are included in the Attachments.

RED FLAG FORECASTS

An example of a RED FLAG WARNING is located under the Attachment link:

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

Ten hour fuel moisture values must be 8% or less. In addition to this fuel moisture criteria, both of the following must occur or have a high probability of occurring:

1) Afternoon relative humidity levels expected to fall to:

25% or lower.

2) 20 foot sustained winds are expected to reach or exceed:

15 mph.

If the forecast office issues a Fire Weather Watch or Red Flag Warning for a specific forest or national park, the fire weather forecaster will highlight the watch or warning in the narrative forecast by using a headline.

A "**Fire Weather Watch**" is used to alert the user to the possible development of a Red Flag event in the near future. This could be up to 72 hours in advance.

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 and the forecast time of onset for the event is less than 8 hours.

Because of the restrictions on user programs brought about by a Red Flag Warning, it is imperative that the warning be promptly canceled when the conditions cease to exist or if the conditions are no longer expected to develop.

CONTENT OF NARRATIVE FIRE WEATHER FORECAST

An example of the fire Weather Planning Forecast is available under the Attachment link. A headline may be added to the top of the forecast, denoting significant weather, or for the issuance of a Red Flag Warning or Fire Weather Watch. 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. The first 36 or 48 hours of the forecast will cover specific weather elements mentioned below. The extended 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 possibility of precipitation, expected high and low temperatures for each day, and wind speeds and direction.

Elements of the narrative are described below.

1. 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.

2. **PRECIPITATION TYPE**

- A. Rain--General, not showery, usually in a stable atmosphere.
- B. Drizzle--General precipitation in a stable 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.
- G. Showers Rain/Snowfall-- Of short duration and varying intensity, usually beginning and ending abruptly.
- H. Thunderstorms--Downpour of rain, often with strong gusty winds. Small hail may also be present.
- I. Severe Thunderstorm-- Heavy downpours of rain, accompanied by wind gusts to 50 Knots (58 mph) or greater, hailstones of 3/4 inches or larger, and/or a tornado.

3. **TEMPERATURE**

The temperature will be in degrees Fahrenheit.

4. **RELATIVE HUMIDITY**

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 at the time of the maximum temperature and the maximum RH occurs at the time of the minimum temperature.

Because of the dependency of the relative humidity upon temperature, it should be noted that if the temperature is under forecast (the actual temperature is higher than forecast), then the forecasted relative humidity will likely will be too high.

5. **WIND - DIRECTION AND SPEED**

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 narrative.

The wind speed will be in miles per hour (mph). The speed is the forecast for the 20-foot level. Speeds pertain to the two minute averages while gusts pertain to the maximum instantaneous value expected.

6. Wind Shift

If a shift in wind direction associated with a frontal passage is expected during the period, the new direction and wind speed will be forecast. Wind shifts may also be mentioned in the synopsis. Because a front may take several hours to move through a zone, the approximate time of the wind shift will be encoded (i.e. Northeast 10 to 15 mph after midnight).

7. POPS and Type

The probability of precipitation, or POP, 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. A forecast of the predominate type of precipitation will accompany a probability of precipitation forecast (**i.e. 40 percent chance of showers, 60 percent chance of rain, 90 percent chance of light snow**).

8. Smoke Management Forecast Parameters

The forecast parameters include mixing height, and transport wind.

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 Clean Air Act has established 500 meters (1700 feet) as a minimum for mixing height for permitting prescribed burning.

A. Afternoon Mixing Height

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 expressed in feet above ground level.

B. Transport Wind

Transport wind is the average wind speed in mph 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 8 mph restricts an agency from burning. Transport wind directions are typically given to eight compass points (e.g. northeast, east southwest, etc.)

C. Smoke Dispersal

Is computed using the maximum mixing height and transport winds. Indices are reported in knot-ft:

Indices are:

0-28,999	Poor
29,000-37,999	Marginal
38,000-49,999	Fair
50,000-94,999	Good
> 95,000	Excellent (Burn with caution)

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

INDIVIDUAL STATION FORECASTS

Maps showing the locations and descriptions of NFDRS stations are included under the Attachments link:

The point forecast will be issued by 3:15 PM daily during the fire weather season. The National Fire Danger Rating System (NFDRS) is a quantitative means for evaluating the fire danger across a vast area such as a forest. This complex model of fuel and weather parameters processes daily weather observations and fuel moisture as input, and fire managers receive numeric output that suggest the severity of fire danger over a large area.

Point Forecast Terminology

1. STATION NAME

Each location will have a name. This name will be provided by the agency requesting the observation site.

2. **STATION NUMBER**

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

3. **VALID DATE**

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

4. **VALID TIME**

The valid time will be 1300 (1:00 PM)

5. **State of the Weather**

A single digit number from 0 to 9.

0 Clear (Less than 1/8th of sky is cloud covered).

1 Scattered Clouds (1/8th to 4/8ths of sky cloud covered).

2 Broken Clouds (5/8ths to 7/8ths of sky cloud covered).

3 Overcast (More than 7/8ths 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

6. **TEMPERATURES**

Temperature forecast for 1:00 PM the next day.

7. **RELATIVE HUMIDITY**

Relative Humidity forecast for 1:00 PM the next day.

8. **LIGHTNING ACTIVITY**

A. Period 1 (L1) is from 2 PM until midnight that night (a 10 hour period). Period 2 (L2) is from midnight the night of the forecast until midnight the next night (24 hour period.)

B. 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 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

9. WIND DIRECTION AND SPEED

Wind forecast at 1 PM the next day. The wind speed is a 10 minute average at 20 feet above the ground measured to 16 compass points (e.g. WSW, NW, NNE, E, etc).

10. TEN HOUR TIME LAG FUEL MOISTURE

Since the fire weather meteorologist does not typically have access to fuel moisture information, an M will be entered for missing.

11. TEMPERATURE

The 24 hour maximum and minimum temperature forecast from 1:00 PM the day of the forecast until 1:00 PM the next day. This will typically be the maximum temperature of the current day and the overnight low expected in the next 12 to 16 hours.

The temperature in the maximum temperature column must be at least equal to or higher than the temperature given in part(6) above. If not, WIMS will not process a forecast for that station.

12. RELATIVE HUMIDITY

The 24 hour maximum and minimum Relative Humidity forecast from 1:00 PM the day of the forecast until 1:00 PM the next day.

The maximum RH value listed must equal or exceed the value given in part (7.) above. Similarly, the minimum RH value must equal or be less than the value in part (7) above.

Either error will cause WIMS to not process a forecast for that station.

13. PRECIPITATION DURATION

The number of hours for which precipitation is forecast. Period 1 is from 1:00 PM the day of the forecast until 5:00 AM the next day (16 hours). Period 2 runs from 5:00 AM the next day until 1:00 PM that same day (8 hours).

14. **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.

FIRE WEATHER OBSERVATIONS

Meteorologists will monitor ROMAN (Real-time Observation Monitor and Analysis Network) to look at the latest observations and determine 10 hour fuels.

SPOT FORECASTS

Requests for Spot or Prescribed Burn forecasts will be made using the internet based NWSSPOT request form. **Spot or Prescribed Burn Forecasts can be requested from the appropriate National Weather Service Office at the websites listed under the Internet Access section.** As a courtesy, land management agencies are requested to call the appropriate National Weather Service Office, to confirm receipt of the spot or prescribed burn forecast request. Once the forecast is completed, it will be available on the NWSSPOT website.

If the NWSSPOT server is down, requests for a spot forecast should be called in or faxed to the forecast office. In this case, the forecast will be faxed back to the requesting agency.

Prescribed Burn forecasts may be requested by federal or state agencies, especially in cases where a prescribed burn is critical or especially large. Federal or state agencies may also request Spot Forecasts for support of wildland fire incidents. Unless otherwise stated by the requesting agency, the forecast parameters of sky condition, weather, temperature, relative humidity, 20 foot wind, significant/sudden changes in wind speed or direction, along with mixing heights, and transport winds shall be provided.

Federal or state agencies requesting prescribed burn or a spot forecast should provide location, elevation, slope, and aspect of the prescribed burn or wildland fire site. This will aid the forecaster in providing a more specific forecast.

METHODS OF COMMUNICATIONS

REGULAR FORECASTS

The narrative forecast and the NFDRS may be found on the INTERNET at the addresses listed under Internet Access:

VERIFICATION OF RED FLAG FORECASTS

Verification of Red Flag Warnings and Fire Weather Watch Forecasts will be conducted at the end of each year.

Methodology of CR Verification for Red Flag Warnings and Fire Weather Watches

The Red Flag Warning/Fire Weather Watch Verification program is divided into four parts:

1. Red Flag Warnings/events for dry thunderstorms.
2. Red Flag Warnings/events for synoptic-scale (i.e. strong winds and low humidity and dry fuels)
3. The Total of both 1 and 2.
4. Fire Weather Watch Forecasts/events.

Verification of Red Flag Warnings and Fire Weather Watches will be "tracked" for each fire weather zone (or county). For example, if a Red Flag Warning is issued for an area comprised of five fire weather zones, it will count as five Red Flag Warnings - one for each zone (or county).

A Red Flag Warning issued at the request of a land management agency will NOT be considered for verification purposes. However, such warnings issued will be tallied separately and, for the purpose of workload indication, will be included in the number of total warnings issued for that office.

Data/information from surface observations (ASOS, RAWS, AWOS, etc.), supplementary and complementary weather sources, satellite and radar imagery, etc. may be used to

verify (or to not verify) Red Flag Warnings and Fire Weather Watches. Experience, judgment, objectivity, consistency, and ethics will be used in verifying.

NOAA WEATHER RADIO

Check the Internet link with this Operations plan to find the latest information on the NOAA Weather Radio.

Fire Weather Watches and Red Flag Warnings are not typically broadcast on NOAA Weather Radio.

MOBILE UNIT SERVICES OVERVIEW

The Advanced Technology Meteorological Unit (ATMU) is composed of two shipping boxes with a total weight of 201 pounds. These units are intended for use by a trained Incident Meteorologist (IMET). All costs incurred by the National Weather Service to have an IMET at a fire (overtime, travel, per diem, tolls, vehicle rental, motels, etc.) will be billed to the requesting agency. This cost generally runs from \$300 to \$400 a day. These units can be used anywhere in the United States. The ATMU provides the equipment and supplies for field meteorological operations. The success of these operations depends on the user agency providing a relatively clean and dry working environment as well as a normal and reliable supply of electrical power.

Most of these units are stored in the western United States. However, two units are stored in London, Kentucky at the US Forest Service's CACHE site.

The IMET will receive his normal pay based on his fixed schedule at the home office; including Sunday, night, and holiday differentials; from the NWS. The requesting agency will be billed for any overtime incurred and for any hazard differentials experienced by the IMET while dispatched to an incident.

Federal agencies desiring the use of the ATMU should request it through their normal regional dispatch channels. Regional headquarters will then normally relay the request back to NIFC at Boise, ID.

State agencies that have a need for the ATMU will request it through the federal agency in their state. If a state asks for the ATMU, all National Weather Service costs will be charged to the Forest Service, who will then charge the state agency.

REQUEST AND DISPATCH OF AN INCIDENT METEOROLOGIST (IMET)

National Weather Service Instruction 10-402 (NWSI 10-402) outlines the procedures and policies of Mobile Unit Services. The following provides a summary of section 2 of this Instruction relating to the procedure that land management agencies should follow when requesting an IMET.

Request and dispatch of IMETs and the equipment needed for them to provide their services (ATMUs and FireRaws) should be accomplished through the National Resource Coordination System.

National Resource Coordination System

The major elements of the **National Resource Coordination System** as related to support of land management consists of:

1. Incidents: Orders for NWS assets are generated at the incident and forwarded to the local dispatch center.
2. Dispatch Centers: Dispatch centers are responsible for providing logistical support to initial attaches and project fires at the unit level. A dispatch center requests support from a Geographic Area Coordination Center (GACC) when resources on a unit are unavailable or are exhausted.
3. Expanded Dispatch: During periods of increased fire activity, an expanded dispatch center may be established to provide enhanced support to large or complex incidents.
4. Geographic Area Coordination Centers: GACCs act as focal points for internal and external requests not filled at the local dispatch centers. If the resource is not available within their geographic area, the resource request is forwarded to the National Interagency Coordination Center (NICC) at Boise, ID.

5. National Interagency Coordination Center. NICC is responsible for coordination movement of all resources between GACCs. NICC is located on the campus of the National Interagency Fire Center (NIFC).

Procedure for requests for IMETS from Land Management Agencies

Resource orders for an IMET in support of a wildland fire incident will follow a similar path as the one presented above. The only difference is that the GACC will not try to fill the order if the IMET cannot be found at the dispatch (WFO) level. The GACC will forward the order immediately to the NICC and the Staff Meteorologist to NIFC (SMN). The process is as follows:

1. An incident will request an IMET from the WFO with fire weather service responsibility for the area. The request will be handled by a dispatch or expanded dispatch center. (If an IMET is not assigned to the local WFO, the dispatch center will send the order directly to the GACC and part 3 below is followed).
2. Meteorologists In Charge (MICs) are responsible for responding to all user agency requests for IMETs to support wildland fires within his/her area of responsibility. Hence, the MIC will either promptly dispatch his/her IMET or notify the dispatch center that he/she is unable to fill the order.
3. In the case where the MIC is unable to dispatch an assigned IMET, the dispatch center will forward the request to the GACC. The GACC will notify the SMN who will try to locate an available IMET within the GACC's area of responsibility. If an IMET is located, the GACC will then initiate the order for the IMET. If no IMET can be located, the order will be sent by the GACC to the NICC. The NICC will contact the SMN to find an available IMET outside of the GACC's area.

Note: If the NICC is at National Preparedness Level 5, then all orders will go straight to NICC and the SMN.

Note: Requests for IMET/ATMU support for non-wildland fire events (e.g., insect eradication or seeding projects, etc,) are left to the discretion of the local MIC. The SMN can be contacted if assistance is needed in filling these requests from outside the fire weather service area.

Procedure for requests for IMETS from Non-Land Management Agencies

Since IMETs, ATMUs, and FireRaws are all national resources, requests from non-land management personnel (such as emergency managers in a HAZMAT incident) should be handled in a manner similar to the procedure described above. In the case of an emergency manager, the dispatch center may be a city, county, or state center. Requests may be received at the closest WFO. Since only a portion of the WFOs have IMETs, the WFO should coordinate with their Regional Headquarters and the Regions should coordinate with the SMN on these types of requests. If the closest WFO cannot fill the request, the MIC will contact the responsible Region and the SMN should be notified of the dispatch as soon as possible.

FIRE WEATHER STATION VISITS

The fire weather forecaster may be requested to accompany an official on a fire weather station visitation. An e-mail requesting the meteorologist should be sent to WFO Louisville a couple of weeks in advance of the planned trip. The e-mail does not need to be specific about dates; this can be arranged over the phone.

TRAINING

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 letter. The letter will be forwarded to NWS Central Region Headquarters so that a reimbursable task code can be assigned for the trip.