

2015 MINNESOTA FIRE WEATHER OPERATING PLAN

NWS Offices

Signed by Mike Stewart, MIC NWS Duluth, MN

Land Management Agencies

Signed by Roy MNICS Task Force Chairman

Minnesota Department of Natural Resources MN DNR

USDA Forest Service - Region 9 (Superior and Chippewa National Forests)

DOI US Fish and Wildlife Service

DOI National Park Service

DOI Bureau of Indian Affairs.



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FIRE WEATHER OPERATING PLAN FOR MINNESOTA NATIONAL WEATHER SERVICE - FEBRUARY, 2014



INTRODUCTION

This document serves as the Minnesota Fire Weather Operating Plan (AOP) for the National Weather Service (NWS) and the interagency fire management community with fire management responsibility in Minnesota. The relationship between the NWS and land management agencies is established in the following documents:

Interagency Agreement for Meteorological Services (National Agreement).
Eastern Area Mobilization Guide
NWS Directives 10-4 Series (See references in this document)

This AOP provides specific policy and procedure information used to provide forecast service to the fire management community in the State of Minnesota. In support of the Eastern Area Coordination Center, the EACC meteorologist will act as a liaison between the interagency fire management community and the NWS.

This Operating Plan is updated annually, and is reviewed by representatives of the NWS and each user agency prior to the onset of the spring fire season. All parties should have a copy of this plan available for reference purposes. Each fire management agency will be responsible for any duplication and further distribution of this plan to fire management personnel. The Operating Plan is also available in the Fire Weather section of NWS web sites.

SUMMARY OF UPDATES FOR 2015

- The Fire Weather Directory, located in the Appendix, has been updated to reflect personnel changes. The new Task Force Chairman is Ron Stoffel; Minnesota DNR.
- The Fire Weather Watch/Red Flag coordination point of contact, Doug Miedtke, has retired. Until his position is filled, the POC will be Tom Fastland.

I. SERVICE AREA AND ORGANISATIONS

A. PARTICIPATING AGENCIES

1. DOC/NOAA - National Weather Service
2. USDA Forest Service - Region 9 Superior and Chippewa National Forests
3. DOI National Park Service
4. DOI US Fish and Wildlife Service
5. DOI Bureau of Indian Affairs.
6. Minnesota Department of Natural Resources; MNDNR

NATIONAL WEATHER SERVICE

There are six NWS offices that provide fire weather forecasts to the State of Minnesota:

www.weather.gov

TWIN CITIES, MN (Chanhassen) NWS Forecast Office

Public Phone 952-361-6670

Fire Weather Program Leader.....Mike Griesinger

michael.griesinger@noaa.gov

DULUTH, MN NWS Forecast Office

Public Phone 218-729-6697

Amanda Graning (IMET) Fire Weather Focal Point

amanda.graning@noaa.gov

GRAND FORKS, ND NWS Forecast Office

Public Phone 701-795-5198

Fire Weather Program Leader.....Al Voelker

al.voelker@noaa.gov

LA CROSSE, WI NWS Forecast Office

Public Phone 608-784-8275

Fire Weather Program Leader.....John Wetenkamp

john.wetenkamp@noaa.gov

SIOUX FALLS, SD NWS Forecast Office

Public Phone 605-330-4247

Fire Weather Program Leader.....Mike Fuhs

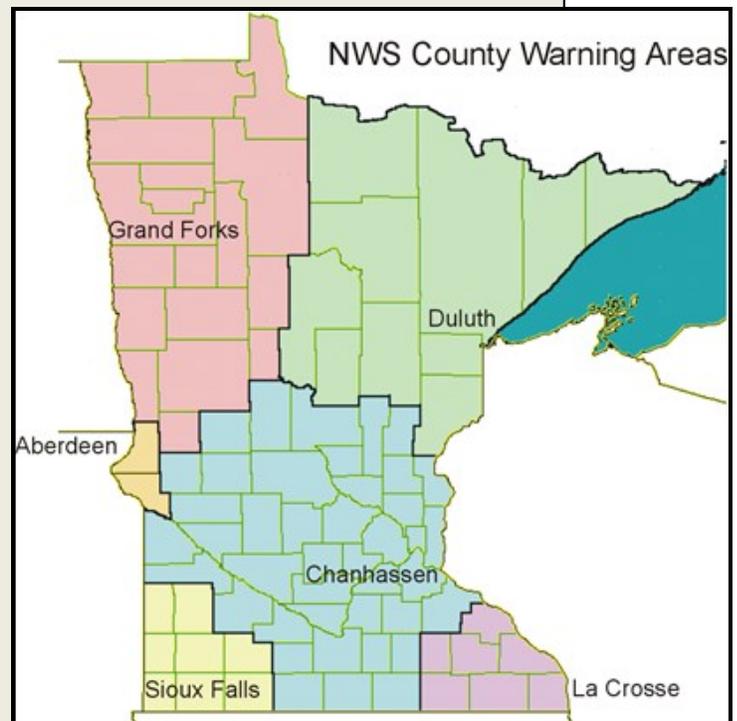
michael.fuhs@noaa.gov

ABERDEEN, SD NWS Forecast Office

Public Phone 605-225-0519

Fire Weather Program Leader.....Travis Tarver

travis.tarver@noaa.gov



II. SERVICES PROVIDED BY THE NATIONAL WEATHER SERVICE

A. BASIC SERVICES - This section follows the National Weather Service Directive NWSI 10-401: <http://www.nws.noaa.gov/directives/sym/pd01004001curr.pdf>

Local changes to the services provided in Minnesota are coordinated at the Minnesota State Fire Weather Coordination Meeting held annually in December in Duluth, MN.

ROUTINE FIRE WEATHER FORECASTS ISSUED BY THE NWS

- Fire Weather Planning Forecast
- National Fire Danger Rating System Forecast (NFDRS)
- SPOT Forecasts
- Fire Weather Watches and Red Flag Warnings

Routine forecasts usually begin in March or early April and end in November or December. User agencies will collaborate with the servicing NWS office to begin or end the text forecasts. Fire weather forecast elements are generated daily and available on the local NWS web sites year round.

1. FIRE WEATHER PLANNING FORECAST

- The Fire Weather Planning Forecast is issued for 98 fire weather zones in MN. These zones generally follow county lines, although some of the larger counties are subdivided into smaller zones.
- This product is issued routinely twice a day during the fire season. Once in the morning by 0700 and again in the afternoon by 1500 local time.
 - *NWS Sioux Falls will only provide a morning forecast issuance during the summer months (June, July, thru mid August), unless requested by land managers to continue the afternoon product.*
- This forecast will be updated when
 - Fire Weather Watch or Red Flag warning has been issued/cancelled.
 - Current forecast is not representative of occurring or expected weather conditions.



2. NFDRS POINT FORECAST (FWM)

- Issued each afternoon by 1530 local time for RAWS stations in their area..
- Lightning Activity Level (LAL) is not forecast for any Minnesota NFDRS sites.

The National Fire Danger Rating System (NFDRS) is designed to represent the fire potential at the “worst time of day” over a large area. The output from the NFDRS serves to indicate levels of fire danger. From this, resource allocation and staffing are determined by the land management agencies.

If a known maintenance or data accuracy problem exists with an NFDRS forecast site, the problem will typically be reported to the station owner by the National Interagency Fire Center (NIFC) RAWS depot via e-mail. It is the duty of the station owner to take corrective action. If a NWS office knows of this problem and maintenance is not completed on the observation site, the NWS office may suspend the NFDRS forecast for that site until the problem is solved. Coordination and notification of the NFDRS forecast suspension will be coordinated with the Predictive Services section (Steve Marien) in the Eastern Area Geographic Area Coordination Center.

Point Forecast coding and interpretation

FCST,SSCCNN,YYMMDD,VT,W,TT,RH,L1,L2,DD,VV,M,TM,TN,HM,HN,P1,P2,WF

STN # code SSCCNN where SS = State (21 is MN) CC = County NN = station

SSCCNN - 6 digit station number from above

YYMMDD - valid day of fcst - year/month/day. The forecast made on April 10, 2010 for the 11th would be 100411

VT - Valid time. Always a 13 for 1300 CST (2pm CDT)

W - State of the weather at 1300 CST tomorrow as shown below

0	= less than 1/8 clouds	4 = fog	7 = snow/sleet
1	= 1/8 to 4/8 opaque clouds	5 = drizzle	8 = showers
2	= 5/8 to 7/8 opaque clouds	6 = rain	9 = thunderstorms
3	= cloudy		

TT = temperature for 1300 CST tomorrow

RH = relative humidity for 1300 CST tomorrow

* L1 = lightning activity level (1400 CST today until 2300 CST). Always a “1” in Minnesota

* L2 = lightning activity level (2300 CST today until 2300 CST tomorrow). Always a “1” in Minnesota

DD = wind direction at 1300 CST tomorrow (8 point compass)

VV = 20 ft wind speed in mph at 1300 CST tomorrow

M = 10 hr fuel moisture (input by the users and left blank by the forecaster). Two commas will be noted next to each other

TM = maximum temperature from 1300 CST to 1300 CST

TN = minimum temperature from 1300 CST to 1300 CST

HM = maximum humidity in percent from 1300 CST to 1300 CST

HN = minimum humidity in percent from 1300 CST to 1300 CST

P1 = pcpn duration in hours from 1300 CST today till 0500 CST tomorrow

P2 = pcpn duration in hours from 0500 CST tomorrow till 1300 CST tomorrow

WF = Wet Flag. A Y or N. It is used to indicate if fuels will be wet at 1300 CST. All indices will be forced to zero if a Y used. If fuels covered with snow, set to Y.

* The L1 and L2 values can range from 1 to 6. The higher the number, the greater the risk of lightning. LALs correspond roughly to categories of thunderstorm density:
1 = none, 2 = isolated, 3 = few, 4 = scattered, 5 = numerous. An LAL of 6 is generally reserved for the west where dry lightning is a problem.

At the request of user agencies in Minnesota, the LAL forecast will always be set to 1 (none).

3. SPOT FORECASTS

SPOT Forecasts are **site specific forecasts** issued by NWS offices in support of wildfire, natural resource management, or public safety. The NWS will attempt to process all Spot Forecast requests within 20-30 minutes. These forecasts aid officials in properly planning for and protecting life and property during wildland fires. Spot forecasts are also issued for hazardous materials incidents, marine incidents, search and rescue response and other threats to public safety.

Generally, SPOT Forecasts for prescribed burns are requested a few hours ahead of the project. They can, however, be requested up to one day in advance with other planning tools and forecasts used for projects planning later. An outlook forecast for a prescribed burn can be requested from Steve Marian with the EACC. (see directory for contact info)

Spot forecasts for a wildfire will be treated with a priority similar to that of severe weather warnings. It is the responsibility of the requestor to indicate that the request is for wildfire suppression.

NWS offices will provide spot forecast service under the following circumstances:

- Upon request of any federal, state, tribal, or local official who represents that the SPOT forecast is required to carry out their wildland fire management responsibilities in coordination with any federal land management agency participating in the Interagency Agreement.
- Upon request of any public safety official who represents the spot forecast is essential to public safety, e.g. due to the proximity of population centers or critical infrastructure.
- In support of Homeland Security Presidential Directive #5. (HSPD 5).
<http://training.fema.gov/EMIWeb/IS/ICSResource/assets/HSPD-5.pdf>

SPOT Content and Format –

The standard format for SPOTS includes: headlines (mandatory when Red Flag Warning or Fire Weather Watch in effect), discussion, sky/weather, temperature, relative humidity, and 20 foot wind for 3 forecast periods. Optional elements may also be provided. The content and number of forecast periods may be different, as determined by the requestor. To aid in making smoke management decisions, requestors may request Hysplit trajectory data as part of their Spot Forecast request.

If an update is made, the forecaster will call the contact number listed on the spot forecast request. Feedback from land management personnel is highly encouraged during or after the burn and can be submitted via the SPOT website or by emailing the Fire Weather Focal Point (see directory for contact info).

SPOT forecasts should be considered one-time requests, and are not routinely monitored, nor updated. Land management personnel **must contact the servicing NWS office for an update if conditions become unrepresentative.**

Requesting a SPOT Procedure –

- The primary way to submit a SPOT request is through the NWS SPOT REQUEST webpage of your local NWS office. See the *Appendix* for detailed instructions on using the Spot Request Page.
- If internet access is not available, the land manager may also call or send a fax to the local NWS office with the appropriate information for the SPOT request.
- Needed information for a SPOT request includes:
 - location, topography, fuel type, size, ignition time, contact info and a current weather observation.
- Spot Forecasts can be viewed in a KML file in Google Earth from the NWS Fire Weather Page at <http://radar.srh.noaa.gov/fire/>

Example of the Duluth NWS SPOT Request Website

<http://spot.nws.noaa.gov/cgi-bin/spot/spotmon?site=dlh>

[Back to NWS Duluth Fire Weather Page](#)

DULUTH SPOT FORECASTS

for
Saturday
← Dec 27 2014 →
[CALENDAR](#)

[Submit a new Spot Request](#)



NWS/NOAA/DJC 9:18 pm CST 12/27/14
Pending Question Complete

Name	Ignition Time	Status
No Entries		

National Oceanic and Atmospheric Administration (NOAA)
National Weather Service
Fire & Public Weather Services Branch
Page Author: NWS Internet Services Team
Page last updated at 7:57 am CST 3/5/07

DULUTH SPOT FORECAST REQUEST

Required Elements in RED (*)

<p>PROJECT NAME</p> <p>(*)Project Name: <input type="text"/></p> <p> <input type="radio"/> Wildfire <input type="radio"/> HAZMAT <input checked="" type="radio"/> Prescribed Fire <input type="radio"/> SAR </p> <p>Ignition Time: 2150 <input checked="" type="radio"/> Central Local Time Date: 12/27/14</p>	<p>REQUESTING AGENCY</p> <p>(*)Requesting Agency: NWS <input type="text"/></p> <p>(*)Requesting Official: test <input type="text"/></p> <p>(*)Phone Number: (218) 729-0653 Ext. <input type="text"/></p> <p>FAX Number: <input type="text"/></p> <p>Contact Person: <input type="text"/></p>
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REASON FOR SPOT FORECAST REQUEST

(*)Must choose either Wildfire or one of the Non-Wildfire reasons

Wildfire

Non-Wildfire

- Under the Interagency Agreement for Meteorological Services (USFS, BLM, NPS, USFWS, BIA).
- State, tribal or local fire agency working in coordination with a federal participant in the Interagency Agreement for Meteorological Services.
- Essential to public safety, e.g. due to the proximity of population centers or critical infrastructure.

For NWS Spot forecast policy, see section 4.0 in NWS Instruction 10-401 at <http://www.nws.noaa.gov/directives/010/010.htm>

<p>LOCATION</p> <p>(*)Lat: <input type="text"/></p> <p>(*)Lon: <input type="text"/></p> <p>7.5' Quad: <input type="text"/></p> <p>Legal (T/R): <input type="text"/></p> <p style="font-size: x-small;">*Enter Lat/Lon (WGS84/NAD83 preferred), Legal(T/R) also acceptable *Legal(T/R) is for WT only.</p>	<p>ELEVATION</p> <p>(*)Elevation: Top <input type="text"/> Bottom <input type="text"/></p> <p>Drainage: <input type="text"/></p> <p>(*)Aspect: <input type="text"/></p> <p>Size: <input type="text"/> (Acres)</p>
--	--

<p>FUEL</p> <p>Type: <input type="text"/></p> <p><input type="radio"/> Sheltering</p> <p><input type="radio"/> Full</p> <p><input type="radio"/> Partial</p> <p><input type="radio"/> Unsheltered</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Place</th> <th>Elev</th> <th>Time</th> <th>Wind</th> <th>Temp</th> <th>Wetbulb</th> <th>RH</th> <th>Dewpt.</th> <th>Sky/Weather</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>	Place	Elev	Time	Wind	Temp	Wetbulb	RH	Dewpt.	Sky/Weather																											
Place	Elev	Time	Wind	Temp	Wetbulb	RH	Dewpt.	Sky/Weather																													

<p>PRIMARY FORECAST ELEMENTS</p> <p>TDA TNT TMR (Today, Tonight, Tomorrow)</p> <p> <input type="checkbox"/> Sky / Weather <input type="checkbox"/> Temperature <input type="checkbox"/> Relative Humidity <input type="checkbox"/> 20 Foot Winds <input type="checkbox"/> Mixing Height <input type="checkbox"/> Transport Winds <input type="checkbox"/> Smoke Dispersal </p>	<p>REMARKS</p> <div style="border: 1px solid gray; height: 100px; width: 100%;"></div>
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Example of a Standardized Spot Weather Forecast

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SPOT FORECAST FOR NETT LAKE RX...BOIS FORTE AGENCY
NATIONAL WEATHER SERVICE DULUTH MN
905 AM CDT MON MAY 5 2014

FORECAST IS BASED ON IGNITION TIME OF 1700 CDT ON MAY 05.
IF CONDITIONS BECOME UNREPRESENTATIVE...CONTACT THE NATIONAL WEATHER
SERVICE.

.DISCUSSION...A WEAK UPPER LEVEL SYSTEM WILL MOVE EAST OF THE AREA
THIS MORNING. PRECIPITATION WILL DIMINISH BY LATE MORNING WITH MOSTLY
CLOUDY SKIES REMAINING THROUGH THE AFTERNOON.AN ISOLATED SHOWER IS
POSSIBLE IN THE AFTERNOON. PREVAILING WINDS WILL BECOME VERY LIGHT
THIS AFTERNOON...WITH A TENDENCY TOWARDS LIGHT EASTERLY WINDS
THIS EVENING.

.TODAY...

SKY/WEATHER.....CLOUDY. A SLIGHT CHANCE OF RAIN SHOWERS
EARLY IN THE AFTERNOON. CHANCE OF PRECIPITATION
20 PERCENT.
MAX TEMPERATURE.....AROUND 52.
MIN HUMIDITY.....54 PERCENT.
WIND (20 FT).....LIGHT WINDS IN THE AFTERNOON.
SMOKE DISPERSAL.....POOR (8500) INCREASING TO FAIR (19400).

TIME (CDT)      5 PM
TEMP.....52
RH.....54
20 FT WIND DIR..SE
20 FT WIND SPD..1
20 FT WIND GUST.2

.TONIGHT...

SKY/WEATHER.....MOSTLY CLOUDY.
MIN TEMPERATURE.....AROUND 37.
MAX HUMIDITY.....85 PERCENT.
WIND (20 FT).....LIGHT WINDS BECOMING SOUTHEAST 3 TO 5 MPH.
MIXING HEIGHT.....4000 FT AGL DECREASING TO 450 FT AGL IN THE
LATE EVENING AND OVERNIGHT.
TRANSPORT WINDS....SOUTHEAST 10 TO 15 MPH.
SMOKE DISPERSAL....FAIR (19000) DECREASING TO POOR (3100) LATE IN
THE EVENING...THEN INCREASING TO POOR (5600)
AFTER MIDNIGHT DECREASING TO POOR (2400) LATE.

TIME (CDT)      7 PM   9 PM   11 PM   1 AM   3 AM   5 AM
TEMP.....51    45    41    40    39    37
RH.....59    70    79    82    82    85
20 FT WIND DIR..E    E    SE    SE    SE    SE
20 FT WIND SPD..2    3    3    4    5    5
20 FT WIND GUST.3    5    5    6    7    6
```

Other resources for forecasts available for fire weather planning:

National Fire Weather Page: www.weather.gov/fire

Fire Weather Briefing Page: <http://www.weather.gov/dlh/?n=fireweatherbriefing>

Graphical Weather Forecast: <http://graphical.weather.gov/sectors/minnesota.php#tabs>

3 day Outlooks: *Fire Weather, Severe Weather, Rainfall*: <http://www.weather.gov/outlooks/dlh>

GACC/EACC Weather: <http://gacc.nifc.gov/eacc/predictive/weather/weather.htm>

MN IMET Resources Page: <http://www.weather.gov/dlh/?n=imet>

7 Day Fronts Loop: <http://www.hpc.ncep.noaa.gov/basicwx/day0-7loop.html>

Severe Weather: <http://www.spc.noaa.gov/>

4. FIRE WEATHER WATCHES AND RED FLAG WARNINGS

NWS offices will issue Fire Weather Watches and Red Flag Warnings when the combination of dry fuels and weather conditions support extreme fire danger and/or fire behavior. The NWS forecaster on duty will coordinate with a representative from MNICS (see directory) prior to issuing a Fire Weather Watch or Red Flag Warning. If a Fire Weather Watch is currently in effect, it means that weather and fuels conditions have already been coordinated with land managers and no further coordination is required if a Red Flag Warning is needed.

During situations of borderline conditions to warrant a Fire Weather Watch/Red Flag Warning, terminology such as “CRITICAL FIRE WEATHER CONDITIONS” is **strongly** encouraged in NWS products. Avoid the phrase “Red Flag” or “Extreme Fire Danger” if a Red Flag Warning is not in effect.

A **Fire Weather Watch** is issued when there is a reasonable confidence that conditions to warrant a warning will be met within 18 to 72 hours. A Fire Weather Watch will NOT be issued or remain in effect the TODAY period. It must either be upgraded to a Red Flag Warning or canceled.

A **Red Flag Warning** is issued when there is a reasonable confidence that conditions to warrant a warning will be met within 48. A Red Flag Warning may span over a multiple day time period.

RED FLAG WARNING / FIRE WEATHER WATCH CRITERIA

- ◆ **Sustained 20 ft winds (RAWS level) of at least 20 mph or frequent gusts of at least 25 mph.**

In the Red River Valley along the western border of Minnesota and in the southwest corner of the state sustained winds must be at or above 25 mph.

- ◆ **Minimum Relative Humidity (RH) of 25% or less.**

- ◆ **Significantly dry fuels as determined by land management**

Land managers may request that a Red Flag Warning be issued when all weather criteria is not expected to be met. This would include situations when fuels are critically dry or in a high wind situation when the humidity threshold may not be reached.

Other Factors

- ◆ Fire Danger Rating from the MNDNR of HIGH or EXTREME.
Viewable at http://www.dnr.state.mn.us/forestry/fire/firerating_restrictions.html
- ◆ NFDRS output provides information on several fire indices.
Viewable at <http://glffc.utah.edu/cgi-bin/gl.cgi>

Generally, a BI >4 and ERC >40 imply critically dry fuels.

Red Flag Content/Format

The Watch or Warning headline will specify:

The valid time, the area affected, and critical weather elements.

```
...FIRE WEATHER WATCH REMAINS IN EFFECT FRIDAY AFTERNOON FOR STRONG
WINDS AND LOW HUMIDITY LEVELS FOR CENTRAL AND MOST SOUTHERN
MINNESOTA...

A FIRE WEATHER WATCH REMAINS IN EFFECT FRIDAY AFTERNOON.

* AFFECTED AREA...CENTRAL AND MOST OF SOUTHERN MINNESOTA.

* WINDS...SOUTH 15 TO 25 MPH WITH GUSTS UP TO 35 MPH.

* RELATIVE HUMIDITY...AS LOW AS 20 PERCENT.

* TEMPERATURE...80 to 85.

* IMPACTS...FIRES COULD BECOME DANGEROUS AND FAST MOVING IN A
SHORT PERIOD OF TIME DUE TO THE GUSTY WINDS AND LOW HUMIDITY
LEVELS.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

A FIRE WEATHER WATCH MEANS THAT CRITICAL FIRE WEATHER CONDITIONS
```

The following list of products will disseminate the Watch or Warning:

- **Fire Weather Planning Forecast (FWF)**
The FWF will be updated if a Watch or Warning is issued at a non-scheduled forecast issuance time.
- **NOAA Weather Radio** Following local policy.
- **Hazardous Weather Outlook (HWO)**
- **Graphical Weather Story**
- **Area Forecast Discussion (AFD).**
- **SPOT Forecasts** issued for areas in which the Watch/Warning is in effect
- **Social Media.** The Fire Danger and issuance of a Watch or Warning may be shared on various social media websites.
- **Civil Emergency Message :** In the event of a large or rapidly growing wildfire that is posing a threat to life or property, a land manager or other official may request the issuance of a Civil Emergency Message to communicate threat of the wildfire and any evacuation orders.
- **Media:** Land agencies will normally handle ALL media questions about fire potential and danger. The NWS will answer questions *only about weather conditions*, and should not comment on fire behavior.

5. OTHER ROUTINE NWS SERVICES

- **Verification** – The Fire weather program leader will verify the Red Flag program. Results will be distributed to the NWS Regional Fire Weather Program Managers as well as to the appropriate State and Federal user groups in Minnesota. Red Flag Warnings will be verified based on the Probability of Detection, False Alarm Rate, Critical Success Index, and Lead Time.
- **Participation in Interagency Groups** - NWS offices providing fire weather services for Minnesota are expected to participate in the Annual State Fire Meeting. This meeting serves as a forum for interaction between NWS program leaders and their interagency users. It also provides an effective vehicle for discussions pertaining to changes to the AOP.
- **National Digital Forecast Database (NDFD)** - The NWS provides another forecast tool called the National Digital Forecast Database (NDFD). This database contains forecast weather parameters on a 2.5 grid. The NDFD runs through day 7, and is continually updated by NWS forecasters. Access to the NDFD is possible through NWS web pages by selecting the Forecast Graphics Tab near the top of the page. Information on the NDFD can be found at the following link: <http://www.weather.gov/ndfd/>

B) SPECIAL SERVICES

INCIDENT METEOROLOGIST (IMET)

The NWS provides a cadre of trained Incident Meteorologists (IMETs) who will provide on-site forecasting for wildfires when requested by land management agencies. A certified IMET, Amanda Graning, is on staff at the Duluth, MN NWS office. See directory for contact information.

Some Key Points Regarding IMETs:

- Only certified Type 1 IMETS may be dispatched to support on-site service for Fire. The NWS is responsible for maintaining proficiency of designated IMETs.
- Request and dispatch of IMETs and equipment is accomplished through the National Resource Coordination System. See directory for contact information.
- In addition to wildfires, IMETs may be dispatched to support large critical resource value prescribed burns, hazardous substance release, or any special projects/incident which fall under the mandate of the NWS. These other events will be supported depending upon availability.

For more information please refer to NWS Directive

10-402 <http://www.nws.noaa.gov/directives/sym/pd01004005curr.pdf>

NWS IMET Google Site: <https://sites.google.com/a/noaa.gov/imet/?pli=1>

C) TRAINING

1. Forecaster training

NWS forecasters producing fire weather forecasts require training as set forth in NWSI 10-405: <http://www.nws.noaa.gov/directives/sym/pd01004005curr.pdf>

- Complete the required NWS Fire Weather computer based learning modules and S-290, Intermediate Wildland Fire Behavior.
- Local training generally consists of review of the AOP, the Fire Weather Station Duty Manual and other station instructions, as well as training offered by the Fire Weather Program Leader or land management personnel.
- Forecasters must be familiar with NWS fire weather products and services, as well as be proficient in their preparation and dissemination.
- All forecasters issuing SPOT Forecasts or providing phone briefings are required to complete IS-100 and IS-700.

2. NWS Provided Training to Land Management Agencies

Guidelines for Teaching Interagency Courses:

Please refer to National Weather Service Directive NWSI 10-403 Appendix A available at: <http://www.nws.noaa.gov/directives/sym/pd01004003curr.pdf>

D) NWS NOTIFICATION TO CENTRAL REGION HEADQUARTERS

In the event of a major wildfire in MN, the servicing ***NWS office must report it to the MIC and NWS Central Region Headquarters (CR-ROC)***. A major fire event is one which results in one or more fatalities, numerous injuries, major property damage, or significant media attention.

III. WILDLAND FIRE AGENCY SERVICES AND RESPONSIBILITIES

A) OPERATIONAL SUPPORT AND PREDICTIVE SERVICES

Meteorologist, Steve Marien, for the Eastern Area Coordination Center (EACC) works in a St. Paul office, while the EACC office is in Milwaukee. The EACC meteorologist combines forecast information from NWS offices and other sources into area-wide summaries and briefings. This meteorologist, along with Fire Intelligence, forms the Predictive Services group which produces fire weather/fire danger assessments for USFS Region 9 which includes Minnesota.

The EACC Forecasts - http://gacc.nifc.gov/eacc/predictive_services/weather/weather.htm
Steve Marien, EACC Meteorologist — Stephen_Marien@nps.gov

Please see the directory in the Appendix for addresses and contact information.

B) AGENCY COMPUTER SYSTEMS

The communication system used to link the NWS with its users is the Weather Information and Management System (WIMS). The NWS receives user agency observations entered into WIMS via its Advanced Weather Interactive Processing System (AWIPS) computer system. Point and narrative forecasts are also sent to WIMS via this system. Observations and forecasts are exchanged between WIMS and AWIPS in the USFS Kansas City Computer Center.

C) FIRE WEATHER OBSERVATIONS AND STATIONS

All fire weather observations in Minnesota are from automated sites, and all have GOES antennas installed for data transmission. Station inspection and instrument maintenance are the responsibility of land management agencies. See Figures 9 and 10.

If a land management agency requests that NWS personnel assist in setting up a RAWS station, the NWS will oblige per the National Agreement. NWS travel expenses for equipment maintenance or station visits will be reimbursed by the Wild Land Fire Agency making the request. The NWS Fire Weather Program Leader and EACC Meteorologist need to be informed of any requests for new RAWS stations.

The NWS is responsible for assigning station numbers to NFDRS weather sites. The NWS local Fire Weather Program Leader will coordinate with the appropriate land management personnel and WIMS staff to determine the 6-digit station ID. It is the responsibility of the requestor/land management personnel to notify WIMS staff of RAWS station status.

Available Sites to View Fire Weather Observations and Locations:

MesoWest: <http://mesowest.utah.edu>

Western Regional Climate Center: <http://www.wrcc.dri.edu/wraws/mnF.html>

National Centers

National Fire Weather Page: <http://weather.gov/fire/>

US National Interagency Fire Center: <http://www.nifc.gov>

Eastern Area Coordination Center: <http://gacc.nifc.gov/eacc/>

D) REIMBURSEMENT FOR NWS PROVIDED ON-SITE SUPPORT AND TRAINING

Agencies will reimburse the NWS for all costs incurred for IMET support as well as for training assistance or station visitation.

IV. JOINT RESPONSIBILITIES

- **TRAINING**

Meteorological training can be provided either by the NWS or the EACC meteorologist. Each NWS office has at least one person, typically the Fire Weather Program Leader, who is qualified to teach courses at least through Intermediate Fire Behavior (S-290). Requests for NWS training should be directed to that office's Fire Weather Program Leader or MIC. Sufficient notice should be given to allow for preparation as well as scheduling. Costs incurred by the NWS will be reimbursed by the requesting agency.

- **COORDINATION CALLS AND WEBINARS**

NWS Fire Weather Program Leaders will participate in MNICS-hosted coordination conference calls. This duty will be shared by the program leaders. If they are not available, the EACC meteorologist or another forecaster on duty may fill in to conduct the weather briefing.

Calls are typically scheduled at 0900 on Tuesdays and Fridays during the fire season. The weather portion of the briefing should focus on the state of MN and be no more than 5 min. The weather briefing will highlight the forecast for the next 2-3 days, as well as any significant weather trends or possible critical fire weather situations in the upcoming week. *Forecasters are asked present weather information in a day-to-day format, rather than element-to-element.*

The Web Ex Conference call is hosted by MNICS on Tuesdays and Fridays during the fire season. A fire weather briefing page is maintained by Amanda at the Duluth NWS and can be viewed at <http://www.crh.noaa.gov/dlh/?n=fireweatherbriefing>

V. EFFECTIVE DATES ON THE AOP

This document will be effective approximately from February 1st, 2015 to February 1st, 2016.

VI. AGENCY SIGNATURES

Michael Stewart, MIC NWS Duluth _____ /Signed/date
Representing all NWS offices with fire weather forecast responsibility in Minnesota

Ron Stoffel, MNICS Task Force Chairman _____ /Signed/date
Signing for MN DNR and All Federal Land Managers
Management Agencies: USFS, BIA, NPS, USFWS

2015 Minnesota Fire Weather Annual Operating Plan

VII. Appendix

- A. Smoke Management
- B. Haines Index
- C. Zones, Counties, Cities, and Weather Stations
- D. NOAA Weather Radio Network
- E. SPOT Forecast Request—Instructions
- F. Fire-Weather Personal Directory (non-web version only)

APPENDIX A - SMOKE MANAGEMENT

The Clean Air Act requires land management agencies to address the issue of smoke management in its prescribed burns. The goal is to burn in atmospheric conditions that would encourage smoke to rise to such a level that the smoke is dispersed as much as possible to reduce a number of health and safety risks near the fire.

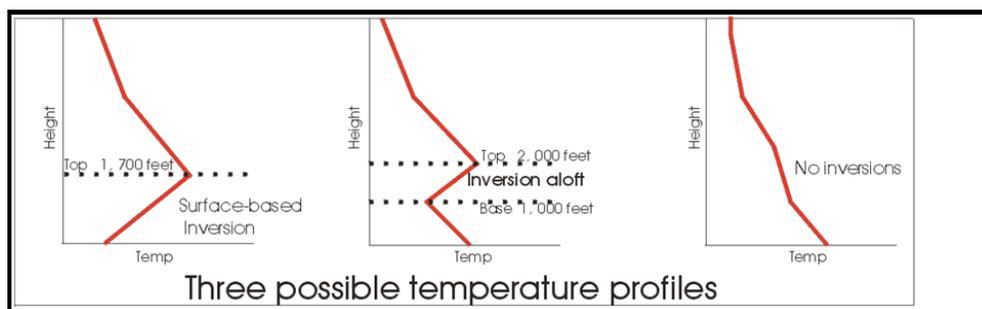
A Minnesota Smoke Management Plan (SMP) was created in the year 2000 and should be considered the source document for any questions regarding the requirements or practices of smoke management in Minnesota. The Plan was updated in 2014.

The National Weather Service will support the smoke management efforts of federal, state, and local agencies as well as organizations involved in such burning. The NWS will provide three (3) parameters used in smoke management in its Fire Weather Planning Forecasts. The NWS will also include these parameters, upon request of the land agency, in spot forecasts.

The three weather parameters of smoke management forecasts are mixing layer (or depth), transport winds, and dispersion index. For smoke management purposes, the mixing layer is usually considered the lowest layers of the atmosphere bounded by the earth's surface and the bottom of any temperature inversion which may exist aloft. A temperature inversion serves to trap smoke at low levels and prevents sufficient lofting of smoke to a level where winds would dilute or transport it away from the area.

Figure 16. Three upper air temperature profiles which affect smoke dispersal differently.

- 1) a surface-based inversion is an absolutely stable condition that traps smoke and prevents lofting.
- 2) An elevated inversion is unstable or neutral and allows limited smoke rise, but the smoke will stop rising at the base of the inversion aloft.
- 3) When no inversions are present, smoke is free to rise. However, the existing (ambient) lapse rate will determine the rate of rise and the plume characteristics.



The transport wind is defined as the average wind speed and direction through the mixing layer.

In forecasts provided by the NWS, the transport wind will be provided in mph and the height of the mixed layer will be in feet agl.

The Dispersion Index is detailed in the Minnesota Smoke Management Plan (SMP) in section 4.2.2. The index is intended to serve as a single adjective index which describes how smoke will disperse on that day. The Dispersion Rate is given by the following formula as defined in the Minnesota Smoke Management Plan:

$$\text{Dispersion Index} = (\text{Mixing Height in feet}) \times (\text{Transport Wind in knots})$$

The Minnesota Smoke Management Plan (SMP) suggests the following interpretation of the values:

Dispersion Index	Dispersion Rate
< 13,000	Poor
13,000 - 29,999	Fair
30,000 - 59,999	Good
60,000 or greater	Excellent

APPENDIX B - HAINES

What is the Haines Index?

The Haines Index combines the effects of *dry air and instability* to determine the potential for fire growth. Its purpose is to identify weather conditions that may allow an existing fire to spread rapidly or exhibit extreme fire behavior. The Haines Index does not account for wind. Instability is caused by warming the lower levels of the atmosphere, cooling the higher levels, or by a combination of the two processes. An unstable air mass promotes convection and rising currents of air.

In Minnesota, we use the mid-level layer of the atmosphere to calculate the Haines Index.
(850 mb = around 5000 feet. 700 mb = ~9000 feet agl).

Computing the Haines Index

Haines Index = Stability (A) + Moisture (B)

Stability Term (A) = 850 mb Temperature - 700 mb Temperature

Let A equal the following values according to the temperature differences

When stability term is 5 degrees C or less, let A = 1

When stability term is 6 to 10 degrees C, let A = 2

When stability term is 11 degrees C or more, let A = 3

Moisture Term (B) = 850 mb Temperature - 850 mb Dew Point

When moisture term is 5 degrees C or less, let B = 1

When moisture term is 6 to 12 degrees C, let B = 2

When moisture term is 13 degrees C or more, let B = 3

(The greater the value of this term, the drier the air is).

Haines = A + B

Haines Values

2 or 3 Very Low

4 Low

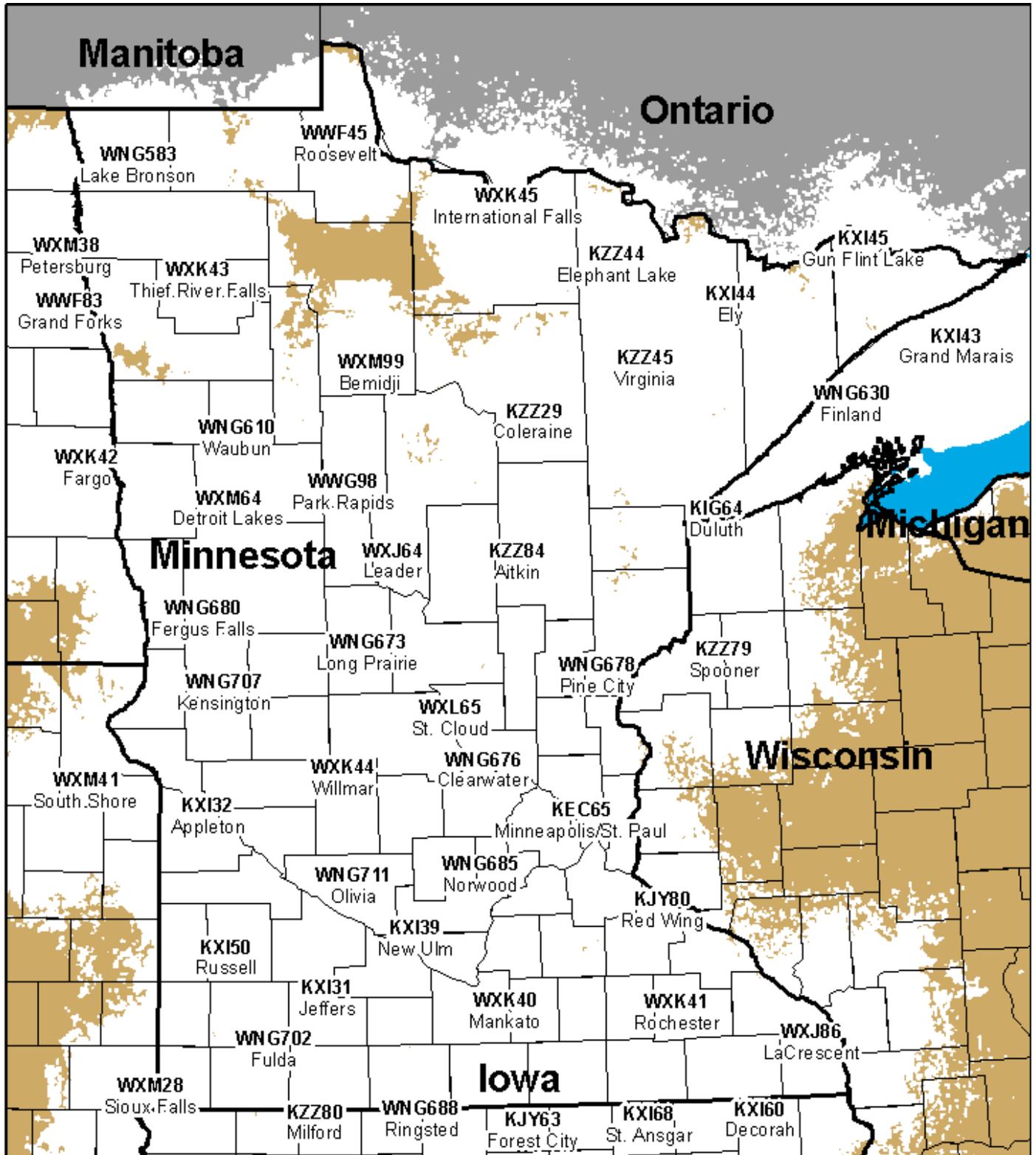
5 Moderate

6 High

A weakness of using the Haines Index is that the stability and moisture terms are calculated at two fixed levels (850 and 700 MB). At times, making the calculations at slightly different levels could lead to a significantly different Haines Index.

APPENDIX C - NOAA Weather Radio Stations

For more information about each transmitter site, and a complete listing of frequencies please visit:
<http://www.nws.noaa.gov/nwr/Maps/PHP/MN.php>



APPENDIX D - HOW TO SUBMITT A SPOT REQUEST

From the Fire Weather Main Page on any National Weather Service web site, click on **"Request Spot"** link

The Spot Forecast Request form will appear. This page auto-updates every minute, so as new spot forecasts are requested or their status changes, you immediately see the changes on the page. We call this the monitoring page. It should be noted that Spot Forecasts on this Web Page are viewable by the public.

MINNEAPOLIS SPOT FORECAST REQUEST

Required Elements in RED

PROJECT NAME

Project Name:

Wildfire WFU HAZMAT
 Prescribed Fire SAR

Ignition Time: Central Local Time

Date:

REQUESTING AGENCY

NOTE: Do not use commas in this section.

Requesting Agency:

Requesting Official:

Phone Number: Ext.

FAX Number:

Contact Person:

REASON FOR SPOT FORECAST REQUEST

Must choose either Wildfire or one of the Non-Wildfire reasons

Wildfire

Non-Wildfire

Under the Interagency Agreement for Meteorological Services (USFS, ELM, NPS, USFWS, BIA).

State, tribal or local fire agency working in coordination with a federal participant in the Interagency Agreement for Meteorological Services.

Essential to public safety, e.g. due to the proximity of population centers or critical infrastructure.

For NWS Spot forecast policy, see section 4D in NWS Instruction 10-401 at <http://www.nws.noaa.gov/directives/010/010.htm>

LOCATION

Lat:

Lon:

7.5' Quad:

Legal (T/R): MT WI

*Enter Lat/Lon, Legal(T/R) also acceptable
*Legal(T/R) is for WI only.

FUEL

Type:

Sheltering

Full

Partial

Unsheltered

OBSERVATIONS

Place	Elev	Time	Wind	Temp	Wetbulb	RH	Dewpt.	Sky/Weather
<input type="text"/>								
<input type="text"/>								
<input type="text"/>								
<input type="text"/>								

PRIMARY FORECAST ELEMENTS

TDA TNT TMR (Today, Tonight, Tomorrow)

Sky / Weather
 Temperature
 Relative Humidity
 20 Foot Wind
 Haines Index

REMARKS

Filling out the SPOT Request Form:

***** Elements in Red are required fields *****

1 _ Project Name: Name of your fire. If there is no name, put in something that you will be able to reference on the Spot Request Page.

* select the type of project. If it is a prescribed burn, please enter in the Ignition Time (using the 24 hour clock) and Date. The form defaults to an ignition time about ½ hour into the future. **If it is a wildfire, remove the default ignition time.**

2 _ Requesting Agency: Name and phone number are required. We consider the contact information very important if we have any questions. You will only need to enter your agency name, phone/fax numbers, and your name the first time you request a spot forecast. After that, it will be filled in with the same information as your last request. Please note that no other people other than you and the NWS will see this information. Only the name of the requesting agency is shown.

You will also have to choose the **Reason for the Spot Forecast Request Wildfire or Non-wildfire**. If a non-wildfire, you must also click on one of the three justifications.

3 _ Location: Proper location data will give us detailed map information on the location of the fire and the terrain in the area.

* Enter the Latitude and Longitude of the fire

4 _ Elevation: The top and bottom elevations of the fire are required. If the burn or fire is on flat ground, you can enter a value in only one of the boxes, preferably the one labeled Top. Drainage is optional and once again references the river drainage basin the fire is in. If you do not know it, go ahead and just submit the request anyway.

5 _ Aspect: Use direction references such as N, NE, E, SE, S, SW, W, NW. If the fire or burn is in flat terrain, you can type in FLAT.

6 _ Size: Enter the acreage if known, but it is an optional field.

7 _ Fuel: Please indicate the type of fuel, either using fuel model numbers, or better yet a description of the fuel such as grass, slash, timber, etc. Also, if you can indicate the amount of fuel sheltering, it helps us in providing accurate wind forecasts.

8 _ Observations: A current weather observation is needed to provide a SPOT forecast. For each observation we need to know where it is in relation to the burn and the time. You must specify if the wind is a 20 foot wind or an eye-level wind. The temperature/wet bulb/Dew point values are in degrees F and the RH in percent. (If you enter a temperature and wet bulb, the RH and dew point will be calculated for you.) Any other weather information can be included in the remarks section of the form.

9 _ Primary Forecast Elements: There are six parameters listed for you. Select which ones you want a forecast for, and the time periods. (available times are Today, Tonight, and Tomorrow).

10 _ Remarks: Any additional information that would be useful for the forecast to know. This includes what wind direction or change in wind direction/speed which would adversely affect the burn.

Hysplit. It is here where you would make a request for Hysplit trajectory output. To obtain this information, simply add to the REMARKS block of the form: **“Hysplit<space>your email address”** The Hysplit run will then be emailed to you. At this time, the lowest trajectory level available is 500 meters with others at 1000 and 3000 meters

11 _ Action: When you hit Submit Request, various checks are performed on the data you have entered. Some problems make it impossible for your request to be accepted (forgetting to enter a name for the burn), while others will produce warnings and messages that are just for your information. You can click on Go Back and Fix and have the opportunity to make the necessary changes. **OR...You can click on Submit Request Anyway, but we may send back a question or call you. You do have one more option and that is to Cancel Request.**

Some of the features on the Internet Spot Forecast Request Form Page include:

[Back to NWS Duluth Fire Weather Page](#)

DULUTH SPOT FORECASTS

for
Thursday
← **May 22 2014** →
[CALENDAR](#)

[Submit a new Spot Request](#)

Name	Ignition Time	Status
WINNIE PONDS	1:00 pm CDT	COMPLETE at 9:39 am CDT
West Six Mile Rx	2:05 pm CDT	COMPLETE at 2:05 pm CDT

National Oceanic and Atmospheric Administration (NOAA)

- * The current date with arrow keys allowing you to step back or forward to a particular date. A calendar is also available, which will allow you past SPOT forecasts.
- * A map of the NWS office’s fire weather area of responsibility. A small colored box will appear on the map indicating the location of any SPOT requests. Green = SPOT pending. Purple = NWS has sent you a question. Red = SPOT complete.
- * A link at the top of the monitoring page will take you back to the NWS Fire Weather Page. So to submit a spot request online, simply click on SUBMIT A NEW SPOT REQUEST.
- * After you have submitted a spot forecast request, an individualized spot forecast web page becomes available for that burn. The page automatically updates every minute so that as new information becomes available for the burn, you see it immediately.
- * When your forecast is complete, it will show up in the spot forecast web page (clicking on the red box in the map or COMPLETED in the Status Box can access the spot). On the forecast page a Feedback box will appear where you can provide us information with respect to how the forecast worked out, perhaps later in the day or several days down the road. This feedback helps us to improve. Simply type in your feedback into the box and click on Send Feedback.
- * You can also view your SPOT in Google Earth. <http://www.wrh.noaa.gov/tfx/php/firekml.php>
- * You can also click on "Copy Info to New Spot Request". This is helpful for burns that last over several days. Rather than having to re-enter the data in the form to get a new forecast, you can view the previous spot request and then copy all the location parameters to a new request using this link. This will save you some time when filling out the request form.
- * Remember, you can also call your NWS office 24/7 in you have any questions!