2013 MINNESOTA FIRE WEATHER OPERATING PLAN

NWS Offices
Signed by Mike Stewart, MIC NWS Duluth, MN

Chanhassen, Duluth, MN
Grand Forks, ND
Sioux Falls, Aberdeen, SD
La Crosse, WI

Land Management Agencies
Signed by Doug Ottosen 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, 2013

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 2013

- The IMET section was updated to remove reference to IMET stationed at the Minneapolis weather office with the retirement of Byron Paulson.
- The NWS Directory was updated to reflect personnel changes. The new Task Force Chairman is Doug Ottosen with the USFS.
- The St Croix RAWS site was added to the list of DNR owned stations and Duluth Forecast Points.

I. SERVICE AREA AND ORGANIZATIONAL DIRECTORY

The following NWS offices provide fire weather forecast service to the State of Minnesota:
See page 6 for a map of NWS forecast areas in Minnesota.

TWIN CITIES/CHANHASSEN NWS Forecast Office
1733 Lake Drive West
Chanhassen, MN 55317-8581
Web Address http://weather.gov/mpx
Backup office: NWS Duluth

Mike Griesinger	Fire Weather Focal Point	Michael.griesinger@noaa.gov
Dan Luna	Meteorologist-in-Charge	Daniel.luna@noaa.gov

DULUTH NWS Forecast Office
5027 Miller Trunk Highway
Duluth, MN 55811-1442
Web Address http://weather.gov/dlh
Backup office: NWS Twin Cities/Chanhassen

Amanda Graning	Fire Weather Focal Point	amanda.graning@noaa.gov
Geoff Grochocinski	Assistant F/W Focal Point	geoffrey.grochocinski@noaa.gov
Michael Stewart	Meteorologist-in-Charge	michael.stewart@noaa.gov

GRAND FORKS NWS Forecast Office
4797 Technology Circle
Grand Forks, ND 58203-0600
Web Address http://weather.gov/fgf
Backup office Bismarck, ND 701-250-4452

Al Voelker	Fire Weather Focal Point	al.voelker@noaa.gov
Brad Hopkins	Assistant F/W Focal Point	brad.hopkins@noaa.gov
Mark Frazier	Meteorologist-in-Charge	mark.frazier@noaa.gov

LA CROSSE NWS Forecast Office
N2788 County Road
La Crosse, WI 54601-3038
Web Address http://weather.gov/arx
Backup Office Des Moines, IA 515-270-4501

Dave Schmidt	Fire Weather Focal Point	dave.schmidt@noaa.gov
John Wetenkamp	Assistant F/W Focal Point	john.wetenkamp@noaa.gov
Glenn Lussky	Meteorologist-in-Charge	glenn.lussky@noaa/gov

SIOUX FALLS NWS Forecast Office
26 Weather Lane
Sioux Falls, SD 57104-0198
Web Address http://weather.gov/fsd
Backup Office Aberdeen, SD

Mike Fuhs	Fire Weather Focal Point	michael.fuhs@noaa.gov
Jeff Chapman	Assistant F/W Focal Point	jeffery.chapman@noaa.gov
Sally Pavlow Johnson	Meteorologist-in-Charge	sally.pavlow@noaa.gov

ABERDEEN NWS Forecast Office
824 Brown County 14 S.
Aberdeen, SD 57401
Web Address http://weather.gov/abr
Backup Office Sioux Falls, SD

Travis Tarver	Fire Weather Program Leader	travis.tarver@noaa.gov
James Scarlett	Meteorologist-in-Charge	james.scarlett@noaa.gov

OTHER IMPORTANT NWS CONTACTS
Larry Van Bussum, Natl F/W Ops Coord (NFWOC)
National Interagency Fire Center (NIFC)
3833 South Development Avenue, Bldg 3807
Boise, ID 83705-5354
e-mail larry.vanbussum@noaa.gov

Jennifer Zeltwanger
Regional Operational Services Meteorologist (ROSM)
National Weather Service,
Central Region Headquarters
7220 NW 101st Terrace
Kansas City, MO 64153
email Jennifer.zeltwanger@noaa.gov
Central Region web site http://weather.gov/crh

Heath Hockenberry
National Fire Weather Program Leader
National Weather Service
3833 South Development Ave.
Boise, ID 83705
email heath.hockenberry@noaa.gov

National Fire Weather web page http://fire.boi.noaa.gov

B. PARTICIPATING AGENCIES

1. DOC/NOAA - National Weather Service (offices listed in part I.A above.)
2. USDA Forest Service - Region 9 (Superior National Forest, Chippewa National Forest)
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

See Appendix A for a full listing of Agency contacts, addresses, and phone numbers.

II. SERVICES PROVIDED BY THE NATIONAL WEATHER SERVICE

A. BASIC SERVICES - This section describes the fire weather products and services provided by the NWS as described in National Weather Service Directive NWSI 10-401. Significant changes to the services provided in Minnesota are generally coordinated at the annual Minnesota State Fire Weather Meeting. Since there are no full-time forecasters devoted solely to fire weather, these duties are scheduled among other warning and forecast responsibilities. However, spot forecasts for wildfires are treated with a high priority.

1. ROUTINE FIRE WEATHER FORECASTS

Forecasts usually begin in early April in southern Minnesota, but have begun as early as mid March. Forecasts are initiated farther north as the snow melts. User agencies are responsible for requesting NWS offices serving their area to begin forecast service. See Figure 1 for the NWS offices and their areas of forecast responsibility. Fire season generally ends across Minnesota in November, but has been extended as late as mid-December. User agencies will coordinate with the appropriate NWS office to determine when forecasts are no longer needed.

Access to Forecasts - Forecasts are available via WIMS, NWS web sites, or on web sites maintained by Predictive Services at the GACCs.

Types of Forecasts;

1. Fire Weather Planning Forecast (FWF)
2. National Fire Danger Rating System Forecast (NFDRS) (FWM)
3. Spot Forecasts (FWS)
4. Fire Weather Watches and Red Flag Warnings (RFW).

2. FIRE WEATHER PLANNING FORECAST

During fire season, **Fire Weather Planning Forecasts** are issued twice daily - once by 0700 with the afternoon issuance by 1500, if possible. During the summer months (June, July, thru mid August) NWS Sioux Falls will only provide a morning forecast issuance, unless requested by land managers to resume/continue the afternoon Planning Forecast. Forecasts are updated if a Fire Weather Watch or Red Flag Warning is issued or cancelled, or the current forecast does not adequately describe expected weather conditions.

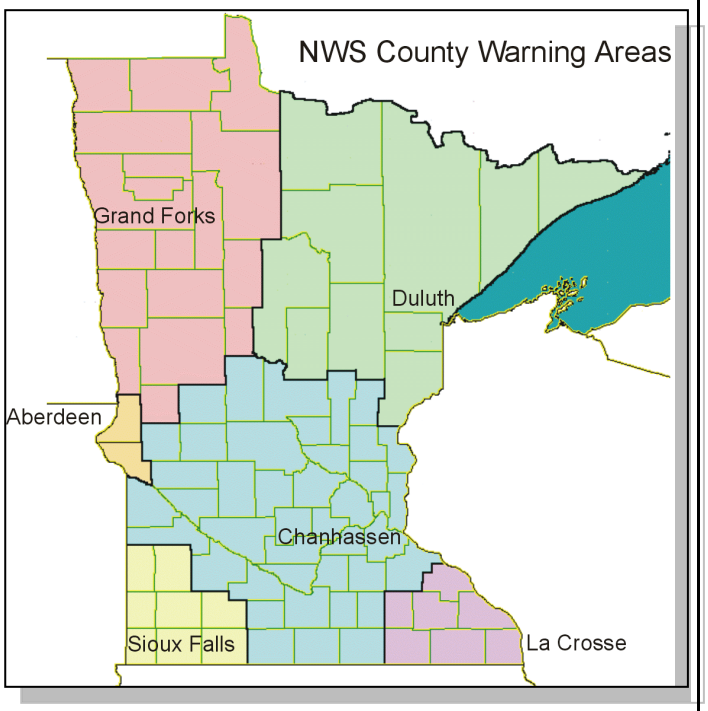

Figure 1 . County Warning Areas (CWA) for NWS offices serving Minnesota.

Fire Weather Planning Forecasts are issued for 98 fire weather zones. These zones, shown in Figure 2 generally follow county lines. Some of the larger counties may be subdivided

into smaller zones. Appendix E has a list of zone numbers, county and key city names, as well as weather reporting stations.

Morning narrative forecasts are written for three forecast periods (TODAY, TONIGHT, TOMORROW). Afternoon narrative forecasts are written for (TONIGHT, TOMORROW, TOMORROW NIGHT, NEXT DAY). A forecast for days 3 through 7 is appended to each forecast group. A wind forecast is included through day 7. A detailed list of forecast elements included in the Fire Weather Planning Forecast and their definitions follows.

NWS offices use a Graphical Forecast Editor (GFE) to prepare a set of gridded forecasts of weather parameters out to 7 days (168 hours).
These elements include – maximum and minimum temperature; hourly temperature, dew point, relative humidity, wind speed and direction, and sky cover. Weather element, probability of precipitation (POP), and precipitation amount (QPF) are generally forecast in six hour periods. Calculated elements include the Haines Index, mixing height, transport

winds, and smoke dispersal.

Text products, including the Planning Forecast, are created by formatters from the GFE, which can then be hand edited by forecasters prior to transmission.

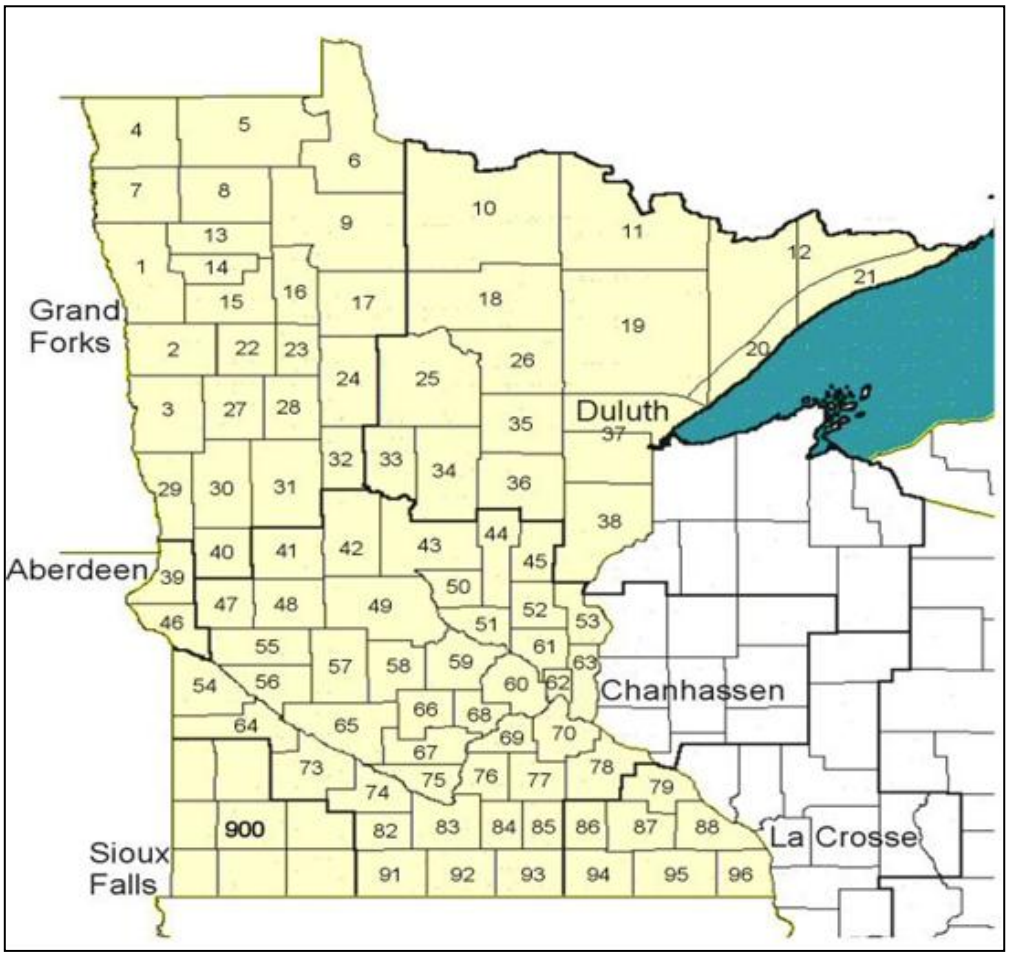

Figure 2. Forecast zone structure for NWS fire weather narrative products is shown below. Some zones are subdivisions of larger counties. Thick, black lines show the boundaries or the County Warning Areas (CWA) or each NWS office.

Forecast Elements in the Fire Weather Planning Forecast

Headline (Required for Red Flag Warnings and Fire Weather Watches)

- Highly encouraged to add headlines for other significant weather concerns or changes such as frontal passages - especially when little precipitation expected, very low humidity, gusty winds, etc.

Discussion

- written with enough detail to give users knowledge of weather causes during the forecast period. Emphasis on first 2 days and significant weather changes in later periods.
- provides frontal positions, movements and timing..
- serves as a vehicle to discuss reasoning for headlines or expected changes in critical parameters such as temperature, humidity, and wind

Sky/Weather

- sky and general weather conditions including trends
- as specific as possible on timing, duration and coverage of precipitation
- as specific as possible on cloud coverage, type, and trends

High and low temperature

- temperature ranges kept as small as possible. Fire Planning Forecast typically uses a 5 degree range.

Relative humidity

- forecast daytime minimum and nighttime maximum
- Fire Weather Planning Forecast typically uses a 5 degree range.

20 ft. wind speed (mph) and direction

- as specific as possible on timing of significant speed and directional changes
- given in ranges of 5 mph or less.
- gusts are also included
- forecast direction to nearest 8 cardinal compass points (northwest, north, southeast)

Other elements included:

Haines Index (mid level Haines used in Minnesota)

- determined for the 850 - 700 MB level (about 5,000 ft to 10,000 ft.)
- attached to "TODAY" and "NEXT DAY" on the morning narrative
- attached to the "TOMORROW" period on the afternoon forecast
- provided throughout the fire season when narrative forecast available.

Smoke Management parameters (See Appendix C for further explanation of terms)

- **Mixing Height** (feet) - The average mixing height from 1200 to 1800 hours local time.
- Included on the "TODAY" and "NEXT DAY" period of the morning forecast
- Included on the "TOMORROW" period on the afternoon forecast
- **Transport Winds (**speed (mph) and wind direction) in the mixed layer
- **Smoke Dispersal** - a number and a text ranking of poor, fair, good, or excellent
- provided throughout the fire season whenever narrative forecast available.

Hours of sunshine

- important for assessing probability of ignition of fine fuels (strong insolation can make fuels more likely to ignite)

Precipitation amount

- average areal amount.

Extended forecasts

- added after each forecast group providing forecasts for the 3-7 day period.
- included are: sky/weather, temperature, with a wind forecast thru Day 7.

**Optional elements in narrative forecasts may vary slightly between NWS offices

Figure 3. Example of a morning narrative forecast for part of central Minnesota

FIRE WEATHER PLANNING FORECAST FOR CENTRAL AND MOST OFSOUTHERN MN AND WC WISCONSIN
NATIONAL WEATHER SERVICE CHANHASSEN/TWIN CITIES MN
600 AM CDT WED MAY 6 2012

.DISCUSSION...AT DAYBREAK A COLD FRONT WAS MOVING INTO THE WESTERN DAKOTAS. WARMER AIR WILL PUSH INTO MINNESOTA AND WISCONSIN AHEAD OF THE FRONT. EXPECT SOUTHERLY SURFACE WINDS TO INCREASE AS THE FRONT APPROACHES. THESE WINDS WILL IMPORT MORE HUMID AIR INTO THE REGION. BY SUNSET THE FRONT WILL PUSH ACROSS THE WESTERN BORDER OF MINNESOTA ARRIVING IN EASTERN MINNESOTA EARLY THURSDAY MORNING. SCATTERED SHOWERS AND THUNDERSTORMS WILL ACCOMPANY THE FRONT. HIGH PRESSURE WILL THEN BUILD INTO THE AREA FOR THE NEXT SEVERAL DAYS BRINGING COOLER AND DRIER WEATHER.

MN039-041-046>048-054>056-064-062130-
TRAVERSE-DOUGLAS-BIG STONE-STEVENS-POPE-SWIFT-LAC QUI PARLE-CHIPPEWA-YELLOW MEDICINE-
INCLUDING THE CITIES OF ALEXANDRIA...MONTEVIDEO
600 AM CDT WED MAY 6 2012

.TODAY...
SKY/WEATHER.....SUNNY AND WARM.
MAX TEMPERATURE.....80 TO 85.
MIN HUMIDITY.....35 TO 40 PERCENT.
20-FOOT WINDS.....SOUTHWEST 10 MPH INCREASING TO 15 MPH BY NOON.
HAINES INDEX.....4 OR LOW.
HOURS OF SUN.....7 TO 9 HOURS.
PRECIPITATION.....NONE.
MIXING HEIGHT.....AROUND 5000 FT AGL (AVE 12-6 PM).
TRANSPORT WINDS.....SOUTHWEST 10 MPH (AVE 12-6 PM).
SMOKE DISPERSAL.....AROUND 50000 OR GOOD (AVE 12-6 PM).

.TONIGHT...
SKY/WEATHER.....MOSTLY CLOUDY. A 40 PERCENT CHANCE OF EVENING THUNDERSTORMS.
MIN TEMPERATURE…...55 TO 60.
MAX HUMIDITY.....85 TO 95 PERCENT.
20-FOOT WINDS.....SOUTHWEST 10 TO 15 MPH BECOMING WEST AFTER MIDNIGHT.
PRECIPITATION.....SCATTERED 0.10 to 0.20 INCH AMOUNTS.

.THURSDAY...
SKY/WEATHER.....PARTLY CLOUDY...BREEZY AND COOLER. A BRIEF AFTERNOON SHOWER
POSSIBLE. PRECIPITATION CHANCE IS 20 PERCENT.
MAX TEMPERATURE....73 TO 77.
MIN HUMIDITY.....35 TO 40 PERCENT.
20-FOOT WINDS.....NORTHWEST 10 TO 15 MPH INCREASING LATE MORNING TO 15 TO 20 MPH.
HAINES INDEX.....4 OR LOW.
HOURS OF SUN.....7 TO 9 HOURS.
PRECIPITATION.....ISOLATED 0.02 TO 0.05 INCH AMOUNTS.
MIXING HEIGHT..... AROUND 4000 FT AGL (AVE 12-6 PM).
TRANSPORT WINDS…...SOUTHWEST 20 MPH (AVE 12-6 PM).
SMOKE DISPERSAL…...AROUND 80000 OR EXCELLENT (AVE 12- PM).

.FORECAST DAYS 3 THROUGH 7....
.THURSDAY NIGHT…PARTLY CLOUDY. LOWS IN THE UPPER 40S. WIND NORTHWEST 10 MPH.
.FRIDAY…PARTLY CLOUDY. HIGHS IN THE LOWER 70S. WIND NORTHWEST 10 TO 15 MPH.
.FRIDAY NIGHT…PARTLY CLOUDY. LOWS IN THE LOWER 50S. WIND WEST 5 TO 10 MPH.
.SATURDAY…MOSTLY SUNNY. HIGHS IN THE MID 70S. WIND WEST 15 MPH.
.SATURDAY NIGHT…MOSTLY CLEAR. LOWS IN THE LOWER 50S. WIND SOUTHWEST 5 TO 10 MPH.
.SUNDAY.....PARTLY CLOUDY. WARMER. HIGHS IN THE UPPER 70S. SOUTHWEST WINDS 15 MPH.
.SUNDAY NIGHT…A CHANCE OF SHOWERS. LOWS IN THE UPPER 50S. WIND SOUTHWEST 10 MPH. CHANCE OF RAIN 30 PERCENT.
.MONDAY…A CHANCE OF THUNDERSTORMS. HIGHS AROUND 80. WIND SOUTHWEST 15 TO 20 MPH. CHANCE OF RAIN 40 PERCENT.
.MONDAY NIGHT…PARTLY CLOUDY. COOLER. LOWS IN THE LOWER 50S. WIND NORTHWEST 10 MPH.
.TUESDAY...PARTLY CLOUDY. HIGHS IN THE LOWER 70S. WIND NORTHWEST 15 TO 20 MPH.
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OTHER ZONE GROUPINGS TO FOLLOW

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Figure 4. Example of an afternoon narrative forecast, for a portion of northwest Minnesota.

FIRE WEATHER PLANNING FORECAST FOR E NORTH DAKOTA AND NW AND WC MINNESOTA
NATIONAL WEATHER SERVICE EASTERN NORTH DAKOTA/GRAND FORKS ND
300 PM CDT SAT JUN 6 2012

.DISCUSSION...GUSTY NORTHWEST WINDS AND COOLER TEMPERATURES WILL FOLLOW A COLD FRONT WHICH MOVED OUT OF THE AREA EARLIER TODAY. HIGH PRESSURE WILL PUSH INTO WESTERN MINNESOTA LATE SUNDAY BRINGING LESS WIND BUT CONTINUED COOL TEMPERATURES. A WARMING TREND WILL BEGIN ON TUESDAY AHEAD OF AN APPROACHING TROUGH OF LOW PRESSURE. THE APPROACH OF THE TROUGH WILL BRING A CHANCE OF SHOWERS BY THURSDAY NIGHT.

MN001>009-013>016-071200-
W POLK-NORMAN-CLAY-KITSON-ROSEAU-LAKE OF THE WOODS-W MARSHALL-E MARSHALL-N
BELTRAMI-PENNINGTON-RED LAKE-E POLK-N CLEARWATER-
INCLUDING THE CITIES OF ROSEAU...THIEF RIVER FALLS
300 PM CDT SAT JUN 6 2012

.TONIGHT...
SKY/WEATHER.....PARTLY CLOUDY AND COOL. BREEZY.
MIN TEMPERATURE.....45 TO 50.
MAX HUMIDITY.....90 TO 95 PERCENT.
20-FOOT WIND.....NORTHWEST 15 TO 20 MPH DIMINISHING TO 10 TO 15 MPH AFTER SUNSET.
PRECIPITATION.....NONE.

.SUNDAY...
SKY/WEATHER.....PARTLY CLOUDY...WINDY AND COOLER.
MAX TEMPERATURE.....60 TO 65.
MIN HUMIDITY.....35 TO 40 PERCENT.
20-FOOT WIND.....NORTHWEST 20 TO 25 MPH DECREASING TO 10 TO 15 MPH TOWARD SUNSET.
HAINES INDEX.....4 OR LOW.
HOURS OF SUN.....7 TO 9 HOURS.
PRECIPITATION.....NONE.
MIXING HEIGHT..... AROUND 4000 FT AGL (AVE 12-6 PM).
TRANSPORT WINDS.....NORTHWEST 25 MPH (AVE 12-6 PM).
SMOKE DISPERSAL.....AROUND 100000 OR EXCELLENT (AVE 12-6 PM).

.SUNDAY NIGHT...
SKY/WEATHER.....PARTLY CLOUDY.
MIN TEMPERATURE.....40 TO 45.
MAXIMUM HUMIDITY....90 TO 95 PERCENT.
20-FOOT WIND.....NORTHWEST 10 TO 15 MPH.
PRECIPITATION.....NONE.

.MONDAY...
SKY/WEATHER.....SUNNY.
MAX TEMPERATURE.....62 TO 66.
MIN HUMIDITY.....35 TO 40 PERCENT.
20-FOOT WIND.....NORTHWEST 10 TO 15 MPH.
HAINES INDEX.....4 OR LOW.
HOURS OF SUN.....7 TO 9 HOURS.
PRECIPITATION.....NONE.
MIXING HEIGHT.....AROUND 5000 FT AGL (AVE NOON-6 PM).
TRANSPORT WINDS.....SOUTHWEST 10 MPH. (AVE NOON-6 PM).
SMOKE DISPERSAL.....AROUND 50000 …GOOD (AVE NOON-6 PM).

.FORECAST DAYS 3 THROUGH 7....
.MONDAY NIGHT…MOSTLY CLEAR. LOWS IN THE LOWER 50S. WIND NORTHWEST 5 TO 10 MPH.
.TUESDAY…SUNNY. HIGHS AROUND 70. WIND NORTHWEST 10 TO 15 MPH.
.TUESDAY NIGHT….CLEAR. LOWS IN THE LOWER 50S. WIND WEST 5 MPH.
.WEDNESDAY…SUNNY. HIGHS IN THE LOWER 70S. WIND SOUTHWEST 10 MPH.
.WEDNESDAY NIGHT…PARTLY CLOUDY. LOWS IN THE MID 50S. WIND SOUTHWEST 10 MPH.
.THURSDAY…PARTLY CLOUDY. HIGHS IN THE MID 70S. WIND SOUTHWEST 10 TO 15 MPH.
.THURSDAY NIGHT… CHANCE OF SHOWERS. LOWS MID 50S. WIND SOUTHWEST 10 MPH. CHANCE OF RAIN 30 PERCENT.
.FRIDAY…A CHANCE OF THUNDERSTORMS. HIGHS IN THE MID 70S. WIND SOUTHWEST 15 TO 20 MPH. CHANCE OF RAIN 40 PERCENT.
.FRIDAY NIGHT…A CHANCE OF THUNDERSTORMS. LOWS IN THE MID 50S. WIND SOUTHWEST 10 MPH. CHANCE OF RAIN 40 PERCENT.
.SATURDAY...A CHANCE OF SHOWERS. HIGHS IN THE LOWER 70S. WIND WEST 10 TO 15 MPH. CHANCE OF RAIN 30 PERCENT.
$$
OTHER ZONE GROUPINGS TO FOLLOW

3. NFDRS POINT FORECAST (FWM)

Issued by 1530 local time for the following RAWS stations.

Chanhassen WFO		Duluth WFO		Grand Forks WFO		Aberdeen WFO		Sioux Falls WFO	
Sherburne	214001	Brainerd	212601	Baudette	210301	Big Stone	231501	Pipestone	216901
Litchfield	214501	Cass Lake	211604	Detroit Lakes	212201				
MN Valley	215601	Ely	210509	Roseau	210203				
Carlos Avery	214201	Hibbing	210512	Agassiz	210801				
Mora	213301	Moose Lake	211803						
Little Falls	213102	Rice Lake	211703						
		Saint Croix	213403						
		Seagull	210709						

The National Fire Danger Rating System (NFDRS) is designed to represent the fire potential at the "worst time of day" over a large area, generally in excess of 100,000 acres. 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.

The NWS GFE formatters are used to generate the NFDRS point forecast from the gridded data base. Forecasters can edit these generated forecasts prior to issuing.

Each afternoon, by 1530 local time, the forecaster will issue point forecasts for stations at which reliable and timely observations are available on that day. If observations are not in the AWIPS collective, they can also be obtained from Internet sites such as the Real-time Observation Monitor and Analysis Network (ROMAN) collective.

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.

In 2011, the Fire Agencies implemented a combined automated and manual observation issuance system, using what is known as the Nelson model. This results in a new observation type "N" and indicates that the Nelson model was used in determining 1-hour and 10-hour fuel moisture. Though several Nelson model observations are generated, only the final "N" type observation is stored for the 1300 LST observation. Several N-model calculations are performed to generate automated State of Weather (SOW) and Wet Flag. A user can at this point manually edit the SOW and Wet Flag values based on local knowledge. In this case, the observation is recalculated, and the type of observation becomes "O" to indicate user editing. The manual editing of SOW and Wet Flag is the key difference, along with automatic availability of the "N" observation type.

During April and May, when necessary, and as forecast duties allow, the forecaster should update the NFDRS point forecasts issued from the previous afternoon if significant changes have occurred. These updates will be available by 0700. NFDRS forecasts will continue from spring through fall for all forecast points.

Lightning Activity Level (LAL) is not forecast for any Minnesota NFDRS sites.

NWS offices are encouraged to verify NFDRS forecasts and share results with State and Federal users.

Figure 5. Point Forecast coding and interpretation

The format is: (commas but NO spaces)

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	(*Note: categories 5, 6, or 7 set NFDRS indecies to zero*)	

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).*

4. SPOT FORECASTS

Spot Forecasts are **site specific forecasts** issued by NWS offices in support of wildfire management, and natural resource management. These forecasts aid land management and fire control agencies in protecting life and property during wildland fires, hazardous fuels reduction, and rehabilitation and restoration of natural resources. 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. Alternative planning tools and forecasts should be used for projects that will not be started within one day of the request. Planned, advance spot forecasts up to one day in advance can however be coordinated with the servicing NWS office for active, long-duration emergencies or fires.

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. The NWS will attempt to process all Spot Forecast requests within 40 minutes.

Some planning tools available for long range planning include:

1) The Fire Weather Planning Forecast from NWS offices.
2) Graphical Weather Forecast available at http://graphical.weather.gov/
3) 7-Day Forecast/Hourly Weather Graph/Digital and Tabular Data available at http://forecast.weather.gov/gridpoint.php?site=xxx where xxx is the local office (mpx = Twin Cities, dlh = Duluth, fgf = Grand Forks, abr = Aberdeen, fsd = Sioux Falls, arx = La Crosse.)
4) Weather Activity Planner available at: http://forecast.weather.gov/wxplanner.php?site=xxx

In accordance with NWS Directive NWSI-401:
NWS offices will provide spot forecasts upon request of any federal, state, tribal, or local official who represents the spot forecast is required to support a wildfire.

For non-wildfire purposes, resources permitting, NWS offices will provide spot forecast service under the following circumstances and conditions:

a. Upon request of any federal official who represents that the spot forecast is required under the terms of the Interagency Agreement for Meteorological Services.
b. Upon request of any 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.
c. 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. A "public safety official" is an employee or contract agent of a government agency at any level (federal, state, local, tribal, etc) charged with protecting the public from hazards including wildland fires of whatever origin and/or other hazards influenced by weather conditions such as hazardous material releases.
d. In support of Homeland Security Presidential Directive #5. (HSPD 5).
   http://training.fema.gov/EMIWeb/IS/ICSResource/assets/HSPD-5.pdf
   NWS offices **will not** provide spot forecasts to private citizens or commercial entities not acting as an agent of a government agency.

Requestor Identification - The requestor for each spot forecast must provide the following information before a spot forecast can be issued. All spot forecasts posted to the Internet will be available for public viewing.

a. Name
b. Government agency
c. Address and phone number
d. Representation as to the reason for the spot forecast, which must be one of the reasons indicated above.

A current on-site weather observation should accompany the forecast request. The requestor should specify how the wind measurement was obtained (20 foot or eye-level). In the case of a wildfire or prolonged prescribed burn, updated observations should be provided during the course of the event. It is suggested that requestors use the REMARKS section of the Spot Forecast request to indicate critical weather parameters such as wind direction or shifts that would be problematic for the operation.

To aid in making smoke management decisions, requestors may now request Hysplit trajectory data as part of their Spot Forecast request.

Land management personnel should contact the servicing NWS office for an update if forecast conditions appear unrepresentative of actual weather conditions. Spot forecasts should be considered one-time requests, and are not routinely monitored, nor updated. Spot forecasts may be updated when representative observations are available to the forecaster, he/she deems the current forecast does not adequately represent current or expected weather conditions, and emergency contact information is available to disseminate the update. If an update is made, the forecaster must call the emergency contact number listed on the spot forecast request. Feedback from land management personnel is also encouraged during or after the burn.

Users are asked to read the most recent Fire Weather Planning Forecast before making a spot forecast request.

A. **SPOT Content and Format –**
The standard format for wildfire 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. See example below. The content of non-wildfire spots should conform to the standard format for wildfire spots, though the content and number of forecast periods may be different, as determined by the requestor.

B. **Requesting a SPOT Procedure –**

a. An Internet-based program, NWS Spot, is the national standard for requesting, issuing, and retrieving spot forecasters. This program is available on NWS web sites. See *Appendix H* for detailed information on using the Spot Request Page. Spot forecasts can also be requested by phone or fax if NWS Spot is inoperative or if discussion is needed with a forecaster. In these cases, a phone call must accompany a fax request so the forecaster is aware of the request.

b. The requesting agency should provide information about the location, topography, fuel type(s), size, ignition time, and a contact and telephone number of the responsible land management official. A representative weather observation should accompany the request. Justification for the spot forecast request must also be provided for the request to

be honored. Feedback to the NWS office providing the spot forecast is highly encouraged.

c. Spot Forecasts can be view in a KML file in Google Earth from the NWS Fire Weather Page at http://radar.srh.noaa.gov/fire/

Figure 6. Example of a Standardized Spot Weather Forecast for a wildfire

SPOT FORECAST FOR CRAZY LAKE FIRE
ISSUED BY NATIONAL WEATHER SERVICE DULUTH, MN
11 AM CDT MONDAY MAY 10 2012

IF CONDITIONS BECOME UNREPRESENTATIVE CONTACT THE NWS

...INCREASING WINDS THIS AFTERNOON... *(headline required for Red Flag Warnings and Fire Weather Watches and recommended for every issuance.)*

.DISCUSSION...SOUTHWEST WINDS WILL INCREASE AHEAD OF AN APPROACHING COLD FRONT. THE FRONT WILL REACH THE BURN AREA BETWEEN 4 PM AND 6 PM THIS EVENING. WINDS WILL RAPIDLY BECOME NORTHWEST AND REMAIN GUSTY UNTIL DARK. AN ISOLATED THUNDERSTORM MAY FORM NEAR THE COLD FRONT.

.REST OF TODAY...
SKY/WEATHER.....MOSTLY SUNNY AND DRY. GUSTY WINDS. AN ISOLATED
THUNDERSTORM POSSIBLE BETWEEN 4 AND 7 PM.
TEMPERATURE.....82 TO 86
HUMIDITY.....32 TO 36 PERCENT
20-FOOT WIND.....SOUTHWEST 15 TO 20 MPH WITH GUSTS TO 25 MPH. WINDS
BECOMING NORTHWEST AFTER 4 PM AND REMAINING GUSTY.
HAINES INDEX.....5 OR MODERATE

.TONIGHT...
SKY/WEATHER..... MOSTLY CLEAR WITH DECEASING WINDS
MIN TEMPERATURE....55 TO 60
MAX HUMIDITY.....80 TO 85 PERCENT
20-FOOT WIND.....NORTHWEST 10 TO 15 MPH DECREASING 5 TO 8 MPH BY 10 PM.

.TUESDAY...
SKY/WEATHER.....PARTLY CLOUDY. BECOMING BREZZY AGAIN.
HIGH TEMPERATURE....77 TO 81
MIN HUMIDITY.....34 TO 38 PERCENT
20-FOOT WIND.....NORTHWEST 8 TO 12 MPH INCREASING TO 15 TO 20 MPH AFTER 11 AM.
$$
(Optional elements may be added at request of user)

Figure 6. Example of a Standardized Spot Weather Forecast for a wildfire.

5. 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. Primary user agencies (USFS and MN DNR) are responsible for keeping the NWS aware of fuel conditions which could lead to extreme fire danger. The NWS will coordinate with user agencies prior to issuing Fire Weather Watches and Red Flag Warnings. However, if a Fire Weather Watch is currently in effect, it means that weather and fuels conditions have already been coordinated with land managers. In this case, no further coordination is required, if a Red Flag Warning is subsequently issued for the same time period and area. *See call list under 4.c. - Procedures*. Any National Forests affected will be specified in the Watch or Warning. During situations of borderline criteria for a Fire Weather Watch or Red Flag Warnings terminology such as SEVERE FIRE WEATHER CONDITIONS MAY OCCUR MONDAY AFTERNOON is strongly encouraged in the synopsis portion of the routine

narrative forecast. A Fire Weather Watch/Red Flag Warning checklist is shown in Figure 8.

A **Fire Weather Watch** is issued when there is a reasonable level of confidence that **BOTH** of the weather conditions listed below are expected to be met within 18 to 72 hours, after consultation with appropriate land managers concerning fuel conditions. A Fire Weather Watch cannot be issued for the first forecast period. If a Watch is in effect for the TODAY period, the midnight shift forecaster must either upgrade to a Red Flag Warning or cancel the Watch.

A **Red Flag Warning** denotes a high degree of confidence weather and fuel conditions consistent with Red Flag Event criteria will occur within 48 hours. A Red Flag Warning is issued immediately, after consultation with land managers, if both of these conditions are observed or imminent.

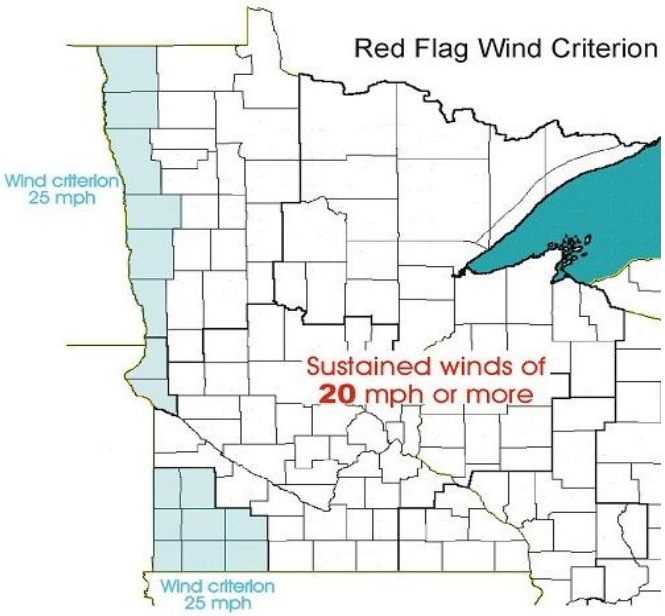
Land managers could request that a Red Flag Warning be issued with weather criteria not meeting these values, if fuels are critically dry – for example, a high wind situation when the humidity threshold may not be reached.

RED FLAG WARNING / FIRE WEATHER WATCH CRITERIA

1. Sustained one-minute winds at standard 20 foot level are at or above 20 mph. *However, 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. See the map depicting these areas in Figure 7.*

2. Minimum relative humidity at or less than 25 percent.

Note: Operationally, the wind used in Red Flag decisions is usually a 33 foot ASOS/AWOS wind. A dense network of airport observing sites across Minnesota provides wind reports at least hourly for the forecaster to use in making watch or warning decisions. Research has shown that the reduction from a 33 foot wind to a 20 foot wind is 10% or less for comparably sited instruments.



Other factors to consider in Watch/Warning decisions;

- Fire Danger Index in the high to extreme category. Source maps for the Fire Danger Rating are on the Minnesota DNR web page at http://www.dnr.state.mn.us/forestry/fire/
- NFDRS output from the NWS product NMCFDICR product which provides information on the Burning Index (BI) and Energy Release Component (ERC). Generally, the BI should be above 4, and the ERC over 40 when a Watch or Warning is issued.

When Red Flag conditions have ended or are no longer expected, the Watch or Warning will be cancelled. This will be coordinated with MIFC.

Content/Format

The Watch or Warning headline will specify:

- The valid time, type of event, area affected, and critical weather elements causing the warning to be issued.
- The following list of products will disseminate the Watch or Warning:

  A Fire Weather Message (RFW) will carry the Watch or Warning Headline. Following the headline will be a discussion of the weather feature(s) causing the event and detail as to the reasons for the event***. (Note: the example below does not include the weather discussion).*** The RFW will employ a **BULLET FORMAT**, as shown below, for each segment of the Watch/Warning.

```
...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 **Fire Weather Planning Forecast (FWF)** will include the headline with the DISCUSSION The headline will also be carried in the appropriate zone groupings. The FWF will be updated if a Watch or Warning is issued at a non-scheduled forecast issuance time.
- The USFS and/or DNR may wish the NWS to distribute a **public statement (RFD)** to be distributed to the media. User agencies will provide guidance as to statement content and if they wish the Red Flag terminology to be used in the product.
- Following local policy a NWS office may broadcast a Red Flag Warning or Fire Weather Watch on **NOAA Weather Radio**.
- Watches or Warnings should also be included in the **Hazardous Weather Outlook (HWO), Graphical Forecasts** and **Area Forecast Discussion (AFD).**
- Any **Spot Forecasts** issued for areas in which the Watch/Warning is in effect will include the appropriate headline.
- User agencies will normally handle all public and media questions about fire potential and danger. The NWS will answer questions only about weather conditions, but should not comment on fire conditions.

Figure 8 – Fire Weather Watch / Red Flag Warning Checklist

FIRE WEATHER WATCH AND RED FLAG WARNING ACTION CHECKLIST (this list may be modified by NWS offices whose fire weather responsibility extends into adjacent states)

Issued		**Canceled**
Date_____	Fire Weather Watch _____	Date_____
Time_____	Red Flag Warning _____	Time_____
Forecaster_____		Forecaster_____

COORDINATION

WFO Minneapolis Time _____
WFO Grand Forks Time _____
WFO Green Bay Time_____
WFO Duluth Time_____
WFO La Crosse Time_____
WFO Sioux Falls Time_____
WFO Aberdeen Time _____

Make these CALLS prior to issuing the Watch or Warning

1) Minnesota DNR, at MIFC Doug Miedtke 218-327-4445 Cell 218-360-1813
   Home 218-327-1464 Time_____

2) **Minnesota Interagency Fire Center (MIFC)**
   MIFC Dispatch (24 hours) 218-327-4558 FAX 218-327-4528 Time_____

(note: if coordination is completed with one of the above, they may be able to contact the other party for you). Try calling Doug Miedtke first.

If a National Forest is affected also call:
Gary Moberly, Forest Dispatcher 218-327-4176 Pager 877-605-9942 Time_____
Cell 218-244-2669

And when time permits call:
Eastern Area Interagency Coordination Center (EACC) in Milwaukee / Duty Officer (24 Hour operation)
414-944-3811 FAX 414-944-3838 Time_____
EACC Meteorologist Steve Marien 651-290-3030, Cell 651-290-7844

DISSEMINATION

RWF Time_____
Added to regularly scheduled FWF: Time _____
Updated FWF: Yes_____ Time_____ No_____
Public statement (coordinated with user agency) Time_____
NWR dissemination (Local NWS policy) Time_____
Notes:_____
_____
_____

6. OTHER ROUTINE NWS SERVICES

- **Verification -** Fire weather program leaders 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 or 5.0 kilometer 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 –

1. INCIDENT METEOROLOGISTS

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 is on staff at the Minneapolis/Chanhassen NWS office. In addition to wildfires, IMETs may be dispatched to support:

- Large critical resource value prescribed burns. An example would be the Fuels Reduction Project in the Boundary Waters Area of Northeast Minnesota.
- Land management coordination and dispatch centers
- Hazardous substance release
- Any special projects or incidents which fall under the mandate of the NWS.

See NWS Directive 10-402 http://www.nws.noaa.gov/directives/sym/pd01004002curr.pdf

By Interagency Agreement, the NWS will support land management agency requests for on-site meteorological support for wildland fires through the IMET program. Other events listed above may be supported depending upon resource availability, if requested by federal fire agencies participating in the Interagency Agreement, or if requested by public safety officials who represent such support as essential to public safety.

Some Key Points:

- 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.
- The Type 1 IMET is responsible for maintaining his/her availability with the NWS Fire Weather Operations Chief Coordinator (NFWOC) at NWS Boise and in the Resource Ordering and Status System (ROSS)
- The IMET will arrive at the Incident with an All Hazard Meteorological Response System

(AMRS). The AMRS is used to provide a mobile platform for data collection and forecast preparation.

- The IMET or the Incident may request an Atmospheric Theodolite Meteorological Unit (ATMU) (NFES 1836) to obtain on-site upper level winds. Helium will also be ordered for the ATMU upon request.
- The NWS is responsible for assembly and operation of this equipment, calibration of instruments, ordering contract repair, and, if necessary, scheduling training sessions.
- IMET data needs will be obtained by one of three means:
  a) Incident provides communications through a LAN
  b) Verizon Wireless Jetpack Wifi
  c) As last resort, BGAN/INMARSAT (satellite comms) at an estimated cost of $1000 to $1500/day.
- The NWS is responsible for assembly and operation of this equipment, calibration of instruments, ordering contract repair, and, if necessary, scheduling training sessions.
- Request and dispatch of IMETs and equipment is accomplished through the National Resource Coordination System. The request will be sent to the Eastern Area Coordination Center (EACC). They will in turn forward the request to the NWS National Fire Weather Operations Coordinator (NFWOC) in Boise who will fill the order.
- Incident Operations - The IMET must be provided a work area free from rain and wind as well as telephone access, if no cell phone coverage is available. The line is typically shared with the Fire Behavior Analyst (FBAN). A source of power is also necessary (generator is OK). The IMET will work the hours and perform the forecast tasks required by the Incident Management Team. When a fire is declared contained or controlled, the IMET will assess the time requirement for further support in conjunction with the FBAN and Plans Section Chief.
- Reimbursement for Services Provided - The NWS will be reimbursed for all costs associated with on-site operation as set forth in the Interagency National Agreement. This can be found in the "Admin" link on the National Fire Weather web page: http://www.weather.gov/fire Reimbursement includes all overtime costs associated with the deployment, travel costs and per diem, telecommunication services, as well as costs incurred by the NWS IMET duty station such as covering shifts vacated by the IMET.
- After each deployment, the IMET will prepare a Report of Reimbursable Expenses. The NWS will recover costs based on this report.
- Upon release from an Incident, NWS offices will follow the Memorandum of Understanding between the NWS and NWS Employees Organization regarding rest periods for IMETs following a deployment.

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

a. Complete any required NWS Fire Weather computer based learning modules and S-290, Intermediate Wildland Fire Behavior.
b. 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.
c. Forecasters must be familiar with NWS fire weather products and services and be proficient in their preparation and dissemination.
d. All forecasters issuing Spot Forecasts or providing phone briefings to first responders are required to complete IS-100 and IS-700

2. IMET Training and Certification requirements - are also detailed in NWSI 10-405. **http://www.nws.noaa.gov/directives/sym/pd01004005curr.pdf**

3. NWS provided training to land management agencies - when NWS staff provides training to land management personnel, costs above planned salary and operating costs may be borne by benefiting agency(s). See the following guidelines for NWS Instructors Teaching Interagency courses from Appendix A of NWSI 10-403. http://www.nws.noaa.gov/directives/sym/pd01004003curr.pdf

NWSI 10-403 APRIL 5, 2010 Appendix A –

Guidelines for Teaching Interagency Courses

1. The request for a NWS instructor for fire agency courses comes through the requesting agency. As with any other out-of-office training assignment, sufficient lead time of typically several months is needed for scheduling purposes and the request is coordinated through the local Weather Forecast Office's Meteorologist-In-Charge. If the office or Region supplying the NWS instructor expects or requires reimbursement, an Interagency Agreement is established with the land management unit paying for the training. For the United States Forest Service (USFS), this Agreement is usually established using the United States Department of Agriculture (USDA) form AD-672. For the Department of Interior, the requesting Agency supplies an Interagency Agreement (IAA) in the local unit's appropriate format. Once the requesting agency initiates and completes their official request form or IAA for training, it is the responsibility of the requested NWS instructor's Region to complete and establish coding for reimbursement. It is important to note that the Interagency National Agreement for Fire Weather Services does not provide the legal or financial exchange mechanism to execute training. More detailed instruction on training agreements, including sample templates, are available on the Incident Meteorologist (IMET) Reimbursable Expense Report (RER) instructions.

2. The course should have a local, state, or federal land management instructor paid by that agency to team teach with the NWS instructor. The co-instructor cannot be from a private vendor or academic institution.
    a. If 1 and 2 above are satisfied, then an instructor can be provided with all overtime and travel costs borne by the requesting agency once an AD-673 or IAA is completed. If 1 and 2 cannot be satisfied or it is unclear whether a local, state, or federal land management instructor has been provided, then go to number
3. The following questions are asked by the WFO to determine whether an NWS instructor can be approved for the course in question:
    a. Is the NWS instructor unique or can this course by taught by anyone else? Are other fire weather instructors (non-NWS) ready, willing and able to teach the course? Contact the Geographic Area Predictive Services meteorologist(s) for information concerning the availability of non-NWS fire weather instructors.
    b. If it is determined through coordination with the Geographic Area Predictive Services meteorologist(s) that non-NWS instructors are not ready, willing and able to teach the course, can the NWS be reimbursed for overtime and travel costs?
    c. If it is determined by answers to questions 3a and 3b that an NWS instructor is appropriate and can be reimbursed, then the NWS instructor may teach the course.

D. NWS EMERGENCY NOTIFICATION TO CENTRAL REGION HEADQUARTERS.

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

also be notified of an IMET deployment. To notify CRH, use procedures detailed in *CR Intranet (Emergency Reporting) – Weather/ Water Significant Event Information.*

III. WILDLAND FIRE AGENCY SERVICES AND RESPONSIBILITIES

A. OPERATIONAL SUPPORT AND PREDICTIVE SERVICES - The GACC Meteorologist for the Eastern Area Coordination Center (EACC) works in a St. Paul office, while the EACC office is now in Milwaukee. The GACC 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. These value added products enhance short and long range forecasts issued by the NWS to assist land managers in allocating fire-fighting resources. The EACC website - http://gacc.nifc.gov/eacc/

Mailing address:
Eastern Area Coordination Center
626 E. Wisconsin Avenue , Suite 500
Milwaukee, WI 53202
Phone 414-944-3811, Fax 414-944-3838
Center Manager, Laura McIntyre-Kelly
Deputy Center Manager, Matt Dillon

EACC Meteorologist
Steve Marien
Mississippi Natl River and Rec. Area
111 East Kellogg Blvd, Suite 105
St. Paul, MN 55101
Phone 651-290-3030, Cell 651-290-7844
Fax 651-290-3815

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 - 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. NWS forecasters may monitor data quality from observation sites. See Figures 9 and 10.

If a land management agency request 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 Regional Fire Weather Program Leader (RFWPL) 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 NWS RFWPL who will then work with appropriate land management personnel and WIMS staff to determine the 6-digit station ID. Once the station ID is coordinated/determined, the NWS RFWPL will provide it to the requestor and responsible NWS office.

It is the responsibility of the requestor/land management personnel to notify WIMS staff of RAWS station status.

Figure 9. Locations of fire weather observation points and automated airport observing systems. The names shaded with yellow receive point forecasts through the fire season.

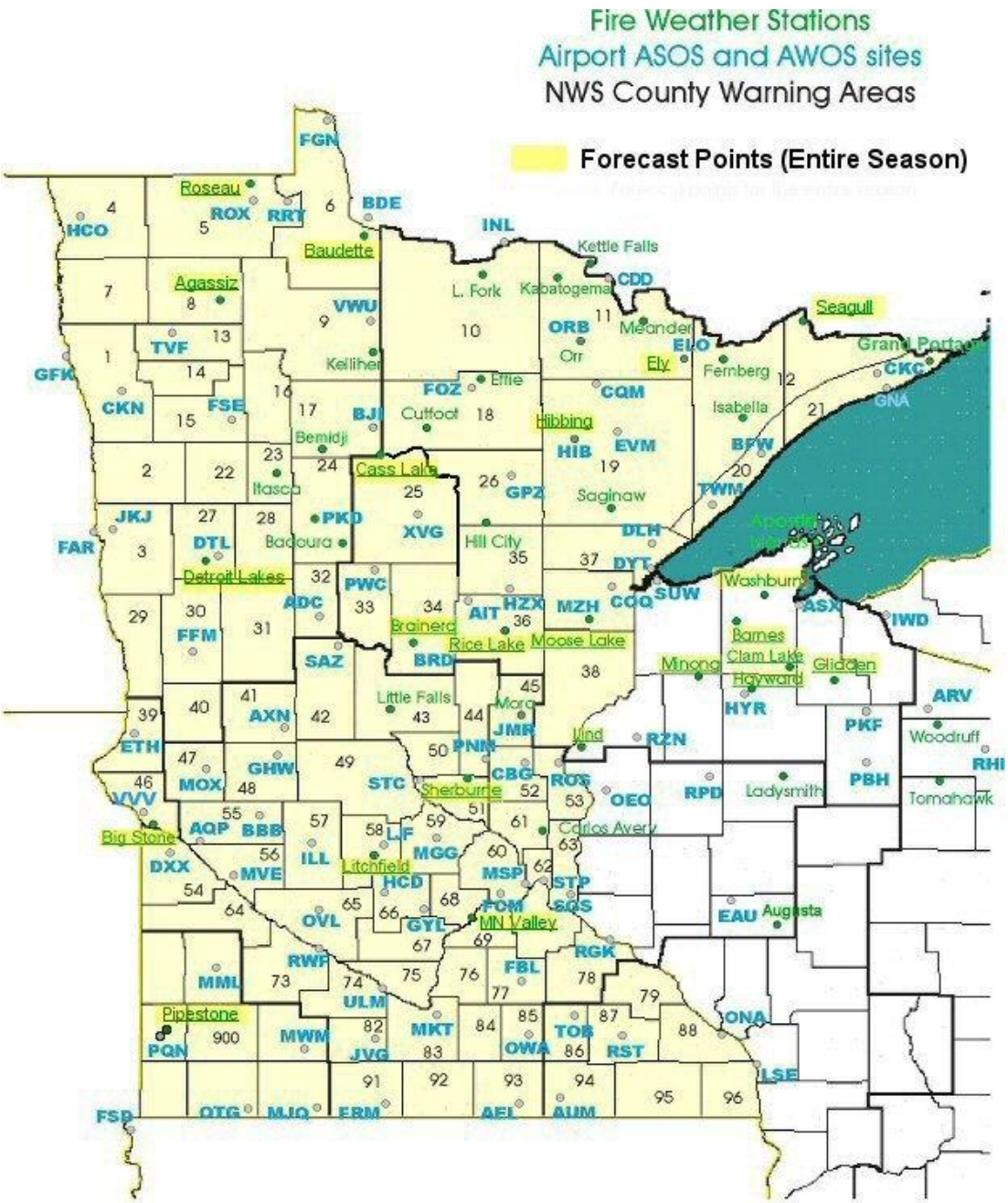
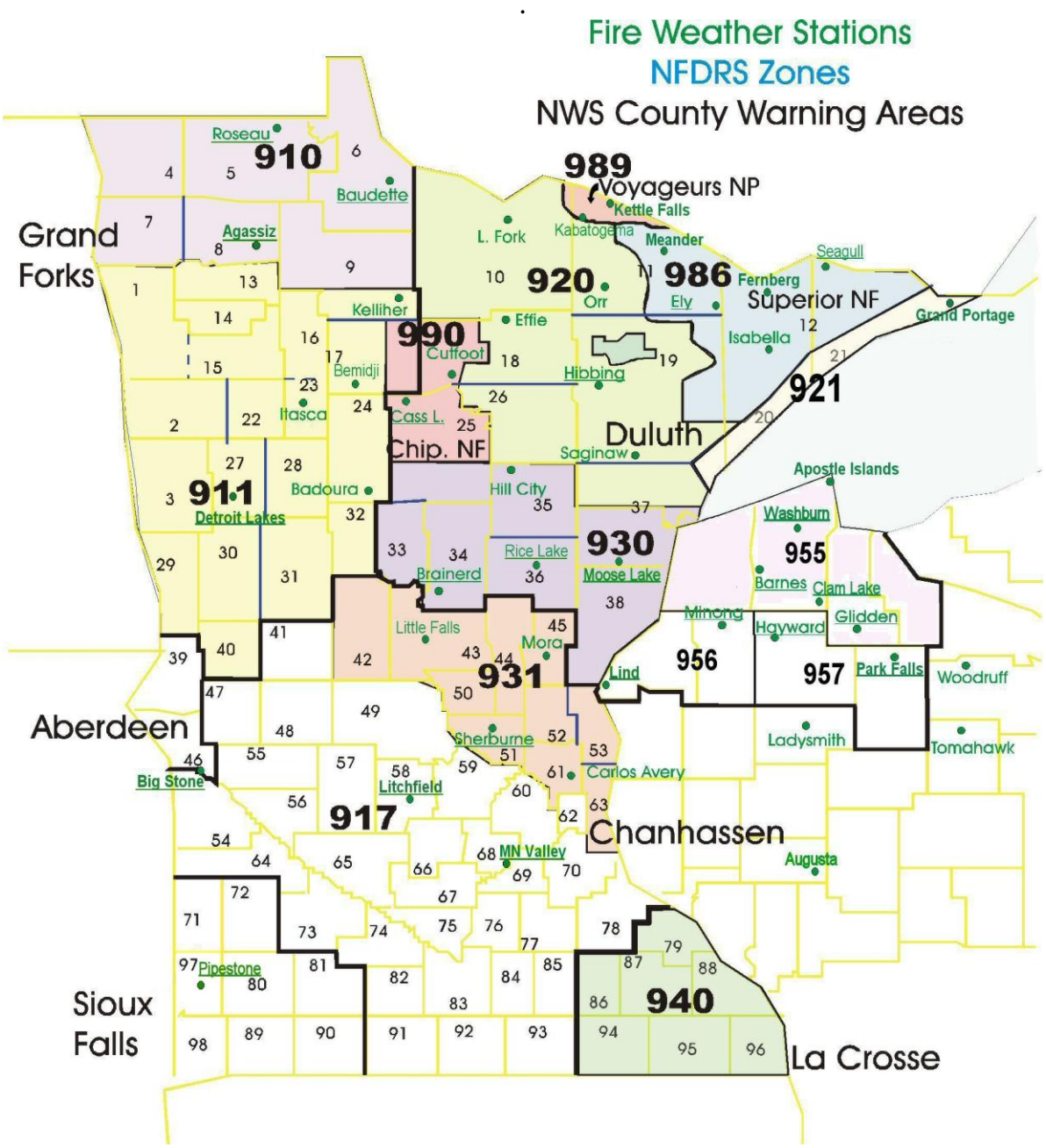


Figure 10 NFDRS zones and the agency observation points



Some Internet sites available to view fire weather observations include:

http://raws.wrh.noaa.gov/roman
http://www.wrcc.dri.edu/wraws/mnF.html
http://mesowest.utah.edu/index.html (this site contains a very useful interactive map)

Some other useful Internet Links include:

National Centers

http://radar.srh.noaa.gov/fire/: National Fire Weather Page
http://www.spc.noaa.gov/products/fire_wx: Storm Prediction Center, Norman, OK (National Fire Weather Guidance).
http://www.nifc.gov: US National Interagency Fire Center
http://www.fs.fed.us/eacc: Eastern Area Coordination Center

International Centers

http://www.ciffc.ca: Canadian Interagency Fire Center

Automated Fire Weather Stations in Minnesota

Minnesota DNR							**U.S. Forest Service**					
		Zone	Lat	Lon	Elev				Zone	Lat	Lon	Elev
Mora	210301	910	48.67	94.62	1083		Ely	210509	986	47.89	91.87	1470
Badoura	211502	911	46.86	94.73	1420		Fernberg	210607	986	47.95	91.49	1700
Bemidji	210901	911	47.5	94.93	1377		Meander	210503	986	48.12	92.02	1520
Brainerd	212601	930	46.4	94.13	1220		Cass Lake	211604	990	47.38	94.6	1320
Carlos Avery	214201	931	45.29	93.12	900		Cutfoot	211005	990	47.54	94.05	1330
Effie	211004	920	47.78	93.65	1340							
Hill City	211702	930	47.04	93.6	1340		**U.S. Fish and Wildlife Service**					
Sagianw	210511	920	46.84	92.46	1330				Zone	Lat	Lon	Elev
Roseau	210203	910	48.85	95.7	1047		MN Valley	215601	917	44.72	93.64	845
Hibbing	210512	920	47.39	92.83	1350		Litchfield	214501	917	45.7	94.53	1075
Orr	210514	920	48.02	92.86	1325		Rice Lake	211703	930	46.54	93.29	1185
Itasca	211401	911	47.24	95.19	1450		Sherburne	214001	931	45.53	93.75	1002
Kelliher	210902	911	47.94	95.46	1350		Big Stone	213501	917	45.26	96.34	878
Littlefork	210405	920	48.39	93.56	1158		Detroit Lakes	212201	911	46.85	95.85	1385
Moose Lake	211803	930	46.42	92.8	1070		Agassiz	210801	910	48.5	95.87	1174
Seagull	210709	986	48.12	90.84	1480							
Isabella	210602	986	47.63	91.41	1990		**National Park Service**					
St Croix	213403	930	45.97	92.62	920				Zone	Lat	Lon	Elev
Mora	213301	931	45.89	93.27	1012		Kabetogema	210507	989	48.44	93.05	1200
							Kettle Falls	210516	989	48.5	92.64	1160
Grand Portage Agency							Pipestone	216901	917	44.03	96.27	1660
Grand Portage	210703	921	47.95	89.78	1200		Little Falls	213102	931	45.95	94.34	1125

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.

For wildfires, procedures are detailed in the Interagency National Agreement found in the "Admin" link on the National Fire Weather web page: http://www.weather.gov/fire. For training, see NWSI 10-403 Appendix A at http://www.nws.noaa.gov/directives/sym/pd01004003curr.pdf

IV. JOINT RESPONSIBILITIES

A. 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.

B. COORDINATION CALLS AND WEBINARS

NWS Fire Weather Program Leaders will participate in MNICS-hosted coordination conference calls, primarily in the spring fire season. This duty will be shared by the program leaders, and if they are not available, the GACC meteorologist, or another duty forecaster at a NWS office. Calls are typically scheduled at 0900 on Tuesdays and Fridays. The NWS briefer should be prepared to provide a statewide briefing highlighting significant weather trends as well as possible critical fire weather situations. Participants are asked to keep their input brief and to the point, lasting less than 5 minutes and to present weather information in a day-to-day rather than element-to-element format. When calls are held twice-weekly, weather information should go out 5 days. When calls are held once-weekly, weather information should include the next 7 days. An internet fire weather briefing page is hosted by NWS Duluth at http://www.crh.noaa.gov/dlh/?n=embrief_fire. The conference call is hosted by MNICS.

V. EFFECTIVE DATES ON THE AOP

This document will be effective approximately from March 1, 2013 to March 1, 2014.

VI. AGENCY SIGNATURES

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

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