



**FIRE WEATHER SERVICES  
ANNUAL OPERATING PLAN**

**FOR**

**VERMONT AND NORTHERN NEW YORK**

**NATIONAL WEATHER SERVICE  
BURLINGTON, VT  
802-862-9883**

**March 2008**

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7. NWS Burlington Forecasters who test and use operational programs daily
8. Chuck McGill: IT, Computer/IT assistance

## **I. Fire Weather Program Overview**

NWS Burlington Fire Weather Team

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This document is based on the new Fire Weather Directives (10-400 series) issued by NOAA's National Weather Service (henceforth known as NWS). The NWS issues a core suite of Fire Weather products consisting of:

- a. Fire Weather Planning Forecast (FWF),
- b. National Fire Danger Rating System Forecasts (NFDRS) (FWM),
- c. Spot Forecast,
- d. Fire Weather Watches (RFW),
- e. Red Flag Warnings (RFW), and
- f. **Rarely**, localized service that is *specifically requested by the fire weather community* to reflect fire danger (**fire danger is different from Red Flag conditions**)

The National Weather Service Fire Weather Program provides forecast and warning services in support of fire management **planning** and **control** operations, leading to the effective prevention, suppression, and management of forest and rangeland fires. The major objective of the Fire Weather Program is to provide a service which will meet the meteorological requirements of federal and state wildland management agencies in the protection and enhancement of the nation's forest and rangelands.

The following is based upon national policy as set forth in the National Agreement. Local users should have a copy of these agreements within their copies of the Operation Plan. The National Weather Service agrees to furnish routine forecasts and warnings according to the needs of the fire weather community during the fire weather season.

**In general, the fire weather forecast season** in Vermont and northern New York **runs from April through mid or late November**. Flexibility has been built into the program, thus seasonal weather patterns will determine the actual dates.

Provisions will be made for forecaster coverage whenever frequent consultation is needed. On rare occasions, during major fires or projects, a fire control agency may request fire weather forecasts and briefings by telephone. As is the policy of the National Weather Service (NWS), these requests will be honored to the best of our ability.

Annually, **the NWS Office MIC and Office Fire Weather Program leader will reassess** issuance criteria, frequency of issuance, format, content, and dissemination (among other issues) for each Fire Weather product. The Fire Weather Program Leader may participate in forestry training sessions and assist in selecting and inspecting forest service fire danger observation stations. The fire control agencies agree to provide and maintain a network of fire danger observation stations. Daily reports of selected stations should be transmitted to NWS Burlington. Each fire control agency headquarters is responsible for the efficient collecting and distribution of National Weather Service forecasts and fire weather observations.

## II. Fire Weather Products

### A. The Fire Weather Planning Forecast

The NWS Burlington area of fire weather responsibility includes most of Vermont and northern New York. **Refer to appendix - A for a map of our fire weather area.** While the forecast will usually be broken up into the areas in appendix-A, the zone groupings will be weather dependent. In addition, the headers will consist of county names, not area names. This allows for more specificity in the Fire Weather Forecast. The forecaster will make every effort to combine zones or counties into groupings that are climatologically homogeneous and represent ongoing or expected weather. Weather at any particular site within a zone may be dictated by microclimates.

**As previously noted, the fire weather season in Vermont and northern New York generally runs from April through approximately November 15<sup>th</sup>.** This year (2008), the season is planned to begin on Monday, March 31, 2008. The issuance time of the fire weather forecast will be **between 5 and 7 AM**. Updated forecasts, *if necessary*, will be issued around noon, or when a Fire Weather Watch or Red Flag Warning is issued or cancelled. **An example of a fire weather planning forecast is on pages 8 through 10 of this document.**

#### **Components of Fire Weather Planning Forecast:**

**Headline** - A headline is **required** when a Fire Weather Watch or Red Flag Warning is in effect. Include the watch/warning type, geographical area, reason for issuance, and effective time period. Also include the headline in appropriate zone grouping. ***Significant*** trends of locally defined critical weather elements should be headlined for non-watch/warning periods.

**Discussion** - Per NWS Directive 10-401, this is a brief, clear and non-technical description of the **weather systems impacting Vermont and Northern New York. Emphasis should be on the first two days**, but later periods may be included if significant weather is expected and the forecaster has a reasonable confidence level that it will occur. Our users have indicated that mention of significant trends in temperature, dewpoint and winds are useful.

Note: Our users have also stated that they prefer that we do NOT use the following terms in our discussions:

- *Elevated Fire Awareness*
- *Near Red Flag Conditions*
- *Fire Danger (or Elevated Fire Danger)*

**Parameters** - The Fire Weather Planning Forecast (FWF) uses the Universal Generic Code (UGC) zone format. The early morning forecast consists of three 12 hour time frames. The

forecast should have a general outlook valid out to day 7. The following meteorological parameters will be entered in the forecast:

**CLOUD AMOUNT:**

CLR (clear).....0 to 25 percent coverage  
MCLEAR (mostly clear).....26 to 51 percent coverage  
PCLDY (partly cloudy).....52 to 68 percent coverage  
MCLDY (mostly cloudy).....69 to 86 percent coverage  
CLDY (cloudy).....89 to 100 percent coverage

**PRECIP CHC (%):** Probability of precipitation in percent (0 - 100%)

**PRECIP TYPE:** The type of precipitation expected.

**MAX/MIN TEMP:** Maximum daytime and minimum nighttime temperatures. (Temperature 24 hour trends are optional.)

**20 FT WND AM:** The prevailing 20 foot wind direction (8 compass points) and speed (mph) during the morning.

**20 FT WND PM:** The prevailing 20 foot wind expected during the afternoon for the daytime period and at night for the nighttime period (follow same nomenclature as AM wind).

**PRECIP AMOUNT:** Amount of average precipitation in inches.

**PRECIP DURATION:** Duration of precipitation in hours during the forecast period. Today/Tomorrow refers to 7 AM to 7 PM, Tonight is 7 PM to 7 AM. Duration does not have to quantitatively equal Precipitation Begin minus Precipitation End times (i.e., on/off precipitation).

**PRECIP BEGIN:** The onset time of any expected precipitation.

**PRECIP END:** The ending time of precipitation.

**HUMIDITY (%):** The minimum relative humidity during the day and the maximum value at night. (Relative humidity 24 hour trends are optional.)

**HAINES:** The **Haines Index** (HI) is calculated for the two **daytime periods**, but not the night period. The Haines Index is a **measure of stability and moisture** (does not incorporate wind or fuel moisture). The **HI** ranges from 2 to 6, which is a sum of two components, a temperature difference (categorized 1 to 3), and a moisture/dewpoint difference (also categorized 1 to 3). There are different options available in the Haines index, each customized for elevation. **For our forecast area, we will be using the low option.**

The following is a qualitative guide for using the **Haines Index**:

HI Value	Qualitative Term
2 or 3	VERY LOW
4	LOW
5	MODERATE
6	HIGH.

The HI has been related to **fire behavior**, such that **the higher the value, the better the chance of seeing large fire development**, mainly where winds are not a factor.

**LAL:** Lightning activity level category. Ranges from 1 to 6 and relates to the areal coverage of thunderstorms, corresponding to Lightning Activity Levels (LAL) from the National Fire Danger Rating System (NFDRS).

LAL and areal coverage should correspond as follows:

LAL Level	Coverage (%)	Descriptor
1	0	None
2	1-14	Isolated
3	15-24	Widely Scattered
4	25-54	Scattered
5	55+	Numerous
6 (Dry lightning)* (little/no rain)	>=15	Widely Scattered or greater

\* *Dry lightning is **extremely** rare in the eastern United States.*

**MIXING HGT/DISP:** The mixing height and inversion/dispersion. The Mixing Height is forecast during the day and inversion/dispersion is forecast at night.

The **Mixing Height** is the maximum depth to which mixing will occur. This can be a difficult parameter to forecast. One way to view this is by estimating the maximum temperature and lifting it dry adiabatically until it reaches the forecast sounding temperature. Generally, during the summer, if neither a low level inversion nor warm air advection is present, daytime heating will produce a well mixed atmosphere of 4000 to 7000 ft in depth. The more unstable the atmosphere, the greater the mixing height.

The **Inversion** time is the start and break times of the ground based inversion. If an inversion is not expected, then forecast NONE. The dispersion is the average dispersion during the night. General guidance for dispersion based on surface winds:

0-4 mph: Poor to Very Poor (VP to PO)  
5-7 mph: Fair (FA)  
8-9 mph: Good (GD)  
10 mph or greater: Excellent (EX)

\*So, for example, a daytime entry might be 3000, a nighttime entry might be 1AM – 8AM/PO, or a nighttime entry for no inversion might be NONE/GD

**TRANSPORT WIND:** The Transport Wind is the average wind from the surface to the top of the mixed layer. After calculating the mixing height, the average wind direction and speed within that layer needs to be calculated. One way to view this is as an estimate based on the surface to 850 mb wind field (approximately 5000 ft). The direction will be specified using 8 compass points, and the speed in miles per hour.

**VENTILATION RATE:** Generalized descriptions range from “Poor” to “Excellent”. There is no definitive classification of Ventilation Rate. It is a combination of mixing height and transport wind. Generally, **when the mixing height is low and transport winds are light, the Ventilation Rate will be poor.** The Ventilation Rate will be calculated only for the daytime periods.

The best procedure to manually calculate the ventilation rate is to multiply the mixing height in thousands of feet by the transport wind speed (mph). **These numbers are placed in the general Fire Weather Forecast. The table below is only a guide.**

**100000 and up.....(corresponds to Excellent)**  
**61000 - 100000.....(corresponds to Good)**  
**41000 - 60000.....(corresponds to Average)**  
**21000 - 40000.....(corresponds to Fair)**  
**20000 or less.....(corresponds to Poor)**

Examples: A) Mixing height 4500 feet, Transport Wind Speed 20 mph.  
                  4500 x 20 = 90000  
          B) Mixing height 2500 feet, Transport Wind Speed 10 mph  
                  2500 x 10 = 25000

**REMARKS:** Any significant information (timing of wind shifts) can be entered here (optional).

**Expanded Forecast Section** - This is the forecast for days 3 to 7, taken from the first grouping in the Public ZONE FORECAST (ALBZFPBTV). ***Winds will be included in each period of the extended forecast section.***

**Outlook 8 to 14 Day** - per Directive 10-401, this is based on local policy. Thus, we will continue using the 8-14 day outlook from the National (EONUS) extended forecast product for Vermont.

# 1. Example of a Fire Weather Planning Forecast from NWS Burlington, VT:

FNUS51 KBTV 091000  
FWFBTV

FIRE WEATHER PLANNING FORECAST  
NATIONAL WEATHER SERVICE BURLINGTON VT  
600 AM EDT WED APR 9 2008

...IF YOU HAD A HEADLINE IT GOES HERE...

DISCUSSION...

A COLD FRONT WILL MOVE EAST OF THE AREA TODAY. HIGH PRESSURE WILL BUILD INTO THE AREA TONIGHT. A WEAK TROUGH OF LOW PRESSURE WILL SPREAD SNOW SHOWERS INTO THE AREA THURSDAY. DEWPOINTS (OR MOISTURE) WILL BE INCREASING ON THURSDAY. TEMPERATURES WILL BE MODERATING LATE IN THE FORECAST PERIOD.

VTZ001-002-005-009-016>018-NYZ028-035-101000-  
EASTERN ADDISON-EASTERN CHITTENDEN-EASTERN CLINTON-EASTERN ESSEX-EASTERN  
FRANKLIN-GRAND ISLE-WESTERN ADDISON-WESTERN CHITTENDEN-WESTERN FRANKLIN-  
600 AM EDT WED APR 9 2008

	TODAY	TONIGHT	THU
	MO CLDY	PT CLDY	MO CLDY
CLOUD AMOUNT	MO CLDY	PT CLDY	MO CLDY
PRECIP CHC (%)	20	20	40
PRECIP TYPE	NONE	NONE	SNOW
MAX/MIN TEMP	20	1	15
20 FT WND AM (MPH)	NW 12		NW 8
20 FT WND PM (MPH)	NW 20	E 2	NW 8
PRECIP AMOUNT	0	0	.02
PRECIP DURATION	0	0	1
PRECIP BEGIN	--	--	1 PM
PRECIP END	--	--	4 PM
HUMIDITY (%)	49	92	57
HAINES INDEX	4	--	3
LAL	1	1	1
MIXING HGT/DISP	7000	NONE/GD	5000
TRANSPORT WIND	NW 15	-- --	NW 10
VENTILATION RATE	105000	--	50000
REMARKS...NONE			
\$\$			

VTZ003-004-006>008-010-101000-  
CALEDONIA-ESSEX-LAMOILLE-ORANGE-ORLEANS-WASHINGTON-  
600 AM EDT WED APR 9 2008

	TODAY	TONIGHT	THU
	MO CLDY	MO CLDY	MO CLDY
CLOUD AMOUNT	MO CLDY	MO CLDY	MO CLDY
PRECIP CHC (%)	30	20	40
PRECIP TYPE	NONE	NONE	SNOW
MAX/MIN TEMP	20	-3	14
20 FT WND AM (MPH)	NW 12		NW 8

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20 FT WND PM (MPH)	NW 20	E 5	NW 8
PRECIP AMOUNT	0	0	.04
PRECIP DURATION	0	0	3
PRECIP BEGIN	--	--	11 AM
PRECIP END	--	--	5 PM
HUMIDITY (%)	45	100	52
HAINES INDEX	4	--	3
LAL	1	1	1
MIXING HGT/DISP	6000	NONE/GD	4500
TRANSPORT WIND	NW 20	-- --	NW 10
VENTILATION RATE	120000	--	45000

REMARKS...NONE  
 \$\$

VTZ011-012-019-101000-  
 EASTERN RUTLAND-WESTERN RUTLAND-WINDSOR-  
 600 AM EDT WED APR 9 2008

	TODAY	TONIGHT	THU
CLOUD AMOUNT	MO CLDY	MO CLDY	MO CLDY
PRECIP CHC (%)	20	10	40
PRECIP TYPE	NONE	NONE	SNOW
MAX/MIN TEMP	24	2	18
20 FT WND AM (MPH)	NW 12		NW 8
20 FT WND PM (MPH)	NW 20	W 2	NW 8
PRECIP AMOUNT	0	0	.02
PRECIP DURATION	0	0	1
PRECIP BEGIN	--	--	1 PM
PRECIP END	--	--	4 PM
HUMIDITY (%)	45	84	53
HAINES INDEX	4	--	4
LAL	1	1	1
MIXING HGT/DISP	5500	NONE/GD	4000
TRANSPORT WIND	NW 20	-- --	NW 10
VENTILATION RATE	110000	--	40000

REMARKS...NONE  
 \$\$

NYZ026-027-087-101000-  
 NORTHERN ST. LAWRENCE-NORTHERN FRANKLIN-SOUTHWESTERN ST. LAWRENCE-  
 600 AM EDT WED APR 9 2008

	TODAY	TONIGHT	THU
CLOUD AMOUNT	PT CLDY	MO CLDY	MO CLDY
PRECIP CHC (%)	20	20	40
PRECIP TYPE	NONE	NONE	SNOW
MAX/MIN TEMP	18	-2	14
20 FT WND AM (MPH)	W 12		W 8
20 FT WND PM (MPH)	W 20	W 2	NW 8
PRECIP AMOUNT	0	0	.02
PRECIP DURATION	0	0	4
PRECIP BEGIN	--	--	11 AM
PRECIP END	--	--	5 PM
HUMIDITY (%)	57	100	62

HAINES INDEX	4	--	4
LAL	1	1	1
MIXING HGT/DISP	5000	NONE/GD	4000
TRANSPORT WIND	NW 25	-- --	NW 15
VENTILATION RATE	125000	--	60000

REMARKS...NONE

\$\$

NYZ029>031-034-101000-  
 SOUTHEASTERN ST. LAWRENCE-SOUTHERN FRANKLIN-WESTERN CLINTON-  
 WESTERN ESSEX-  
 600 AM EDT WED APR 9 2008

	TODAY	TONIGHT	THU
	MO CLDY	MO CLDY	MO CLDY
CLOUD AMOUNT			
PRECIP CHC (%)	30	20	40
PRECIP TYPE	NONE	NONE	SNOW
MAX/MIN TEMP	16	-6	12
20 FT WND AM (MPH)	W 12		W 8
20 FT WND PM (MPH)	W 20	W 2	NW 8
PRECIP AMOUNT	0	0	.04
PRECIP DURATION	0	0	1
PRECIP BEGIN	--	--	1 PM
PRECIP END	--	--	4 PM
HUMIDITY (%)	52	100	66
HAINES INDEX	4	--	3
LAL	1	1	1
MIXING HGT/DISP	6000	NONE/GD	5000
TRANSPORT WIND	NW 15	-- --	NW 10
VENTILATION RATE	90000	--	50000

REMARKS...NONE

\$\$

.FORECAST EXTENDED...  
 .THURSDAY NIGHT...MOSTLY CLOUDY WITH A CHANCE OF SNOW SHOWERS. LOWS 5  
 BELOW TO 5 ABOVE. WINDS NORTHWEST 15 TO 25 MPH. CHANCE OF SNOW 40 PERCENT.  
 .FRIDAY...MOSTLY CLOUDY WITH A CHANCE OF SNOW SHOWERS. HIGHS 15 TO 20.  
 WINDS NORTHWEST 15 TO 25 MPH. CHANCE OF SNOW 30 PERCENT.  
 .FRIDAY NIGHT...CLOUDY. LOWS 5 TO 10 ABOVE. WINDS NORTH 5 TO 15 MPH.  
 .SATURDAY...PARTLY SUNNY. HIGHS IN THE 20S. WINDS NORTHWEST 10 TO 15 MPH.  
 .SATURDAY NIGHT...MOSTLY CLEAR. LOWS 5 TO 15. WINDS NORTHWEST 5 TO 10 MPH.  
 .SUNDAY...PARTLY SUNNY. HIGHS 30 TO 35. WINDS WEST 5 TO 10 MPH.  
 .SUNDAY NIGHT...MOSTLY CLEAR. LOWS 15 TO 25. WINDS SOUTH 5 TO 10 MPH.  
 .MONDAY...INCREASING CLOUDS. HIGHS 40 TO 45. WINDS SOUTH 5 TO 10 MPH.  
 .MONDAY NIGHT...MOSTLY CLOUDY. LOWS 25 TO 30. WINDS SOUTH 5 TO 10 MPH.  
 .TUESDAY...PARTLY SUNNY. HIGHS 45 TO 50. SOUTH WINDS 10 TO 20 MPH.

.OUTLOOK 8 TO 14 DAY...  
 TEMPERATURE NEAR NORMAL. PRECIPITATION NEAR NORMAL.

\$\$

SMOKEY AND READY

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## **B. Forecast Updates:**

During the fire weather season, the fire weather forecaster will closely monitor weather conditions and issue an updated forecast if conditions are expected to **deviate significantly** from the original forecast. As a guide, an updated fire weather forecast should be issued only when any of the following criteria are met:

1. Red Flag criteria met, but not previously anticipated.
2. Observed wind is 10 mph or greater than forecast, and the direction differs by two or more compass points (based on 8 compass points).
3. Relative humidity, originally forecast to be greater than 30 percent, is now expected to be less than 30 percent.
4. Numerous thunderstorms where none were previously forecast.
5. The occurrence (or non-occurrence) of precipitation will **significantly** differ from the forecast.
6. Any unexpected weather conditions that will **significantly** impact fire service operations. (unexpected wind shifts, etc.)

## **C. Forecast Backup Responsibilities:**

In the event that NWS Albany is unable to produce their fire weather forecasts and watches or warnings, NWS Burlington is their backup. In that role, we would produce their forecasts (ALBFWFALY) with a line in the MND Header stating that the product was produced by NWS Burlington, VT.

### III. Red Flag Program

#### A. Red Flag Event

*from NWS Directives 10-401:*

Forecasters will issue Fire Weather Watches/Red Flag Warnings when the combination of dry fuels and weather conditions support extreme fire behavior. These conditions alert land management agencies to the potential for widespread new ignitions or control problems with existing fires, both of which could pose a threat to life and property.

A red flag event is the **combination of a critical fire weather pattern and significantly dry fuels**. This combination could lead to the occurrence of large and dangerous wildfires. Since the potential for Red Flag conditions does not exist without receptive fuel conditions, knowledge of existing fuel conditions is essential. While Red Flag conditions may vary for each fire weather district, the purpose of the Red Flag Program is to alert land management agencies to developing weather conditions that, when coupled with critically dry wildland fuels, could lead to dangerous fire behavior. It is important to point out that High Fire Danger by itself does not necessarily result in Red Flag conditions. Red Flag generally reflects how fires may behave after they are ignited, while fire danger specifically relates to the likelihood of fire development.

#### B. Red Flag Criteria

NWS Directives 10-401 states that ***both fuel and weather parameters*** are important considerations. It suggests that the following weather criteria be considered:

- a. Lightning after an extended dry period
- b. Significant dry frontal passage
- c. Strong winds
- d. Very low relative humidity
- e. Dry thunderstorms

Thus, in the WFO Burlington Fire District, elements considered critical for red flag consist of a combination of:

- a. **Meteorological parameters** (winds, relative humidity, etc),
- b. **Long term dryness** (past rainfall and Keetch-Byram index), and
- c. **Vegetation status.**

WFO Burlington shall use the following sets of criteria to determine when a red flag warning will be issued for particular zones. Note there are two different criteria based primarily upon the season. **Forestry personnel will inform us of which vegetative stage we are in.**

**\*\*ALL OF THESE FACTORS HAVE TO BE MET IN ORDER TO HAVE A RED FLAG EVENT\*\***

**When in Vegetative Stage I & II (cured & pre green up Spring/Fall)**

- Winds **sustained** or with **frequent** gusts above 25 mph, **and**
- Relative Humidity at or below 30%, **and**
- Rainfall amounts for the previous 5 days of less than 0.25 inches

**When in Vegetative Stage III (green Summer)**

- Winds **sustained** or with **frequent** gusts above 25 mph, **and**
- Relative Humidity at or below 30%, **and**
- Rainfall amounts for the previous 8 days of less than 0.25 inches, **and**
- Keetch-Byram Drought Index values of 300 or greater

## C. Fire Weather Watch

Our **Vermont** and **New York Fire Weather Users** have stated that they do NOT require a telephone call before we issue a Fire Weather Watch. However, the WFO Burlington forecaster will **call both Vermont (Tess Greaves) and northern New York Forest Ranger Dispatch contacts** at a reasonable time after the issuance of the watch. The phone contacts are the same as for a Red Flag Warning. After issuance of a Fire Weather Watch, and notification of our users, Steve Marien at the Eastern Area Geographical Area Coordination Center (612-713-7300) should be notified.

**ISSUANCE:** The Fire Weather Watch is issued under the PIL...ALBRFWBTV.

**Note:** Starting this season (2008), **Fire Weather Watches and Red Flag Warnings will now be broadcast on NOAA Weather Radio.**

Forecasters should issue a Fire Weather Watch when there is a high potential for development of a Red Flag Event (per directives 10-401). The watch may be issued for the entire area or selected portions. However, our Vermont users have told us that it is simpler to issue for the entire area. The watch remains in effect until: 1.) It is cancelled, 2.) Upgraded to a Red Flag Warning, or 3.) Expires. Whenever any of the 3 actions in the previous sentence occur, an updated RFW will be issued as well as an updated routine fire weather forecast to reflect these changes.

**The Fire Weather Watch is issued 36 to 72 hours in advance of the expected onset of criteria** (generally 3rd period on). A watch may only be issued (or continued) in the first 24 hours for dry thunderstorms. **However, our users have stated that they prefer that we highlight the “dry thunderstorms” in the routine forecast and not issue a Watch for this event,** unless the forecaster believes it is critical.

Per NWS Directives, a Fire Weather Watch should NOT be issued or continued in low confidence (below 50 percent) or borderline events. In these situations, the forecaster should describe the threat and uncertainty within the discussion in the routine forecast. A forecaster should cancel the watch if confidence to keep it is too low. As a guide, the confidence level of the forecaster should be about 50 percent or higher.

**Remember, when a watch is issued, a headline needs to be included in the ALBFWFBTV, and an appropriate ALBRFWBTV statement is required. The headline should state something similar to the following (ensure time, location, and reason for are mentioned):**

...FIRE WEATHER WATCH FOR TUESDAY IN THE CHAMPLAIN VALLEY OF VERMONT AND NORTHERN NEW YORK FOR STRONG WINDS AND LOW HUMIDITY...

If a watch has been issued by the early morning forecaster for the next day (period 3), the

daytime forecaster will need to decide what to do with the watch with the afternoon forecast package. This will require the issuance of an RFW and headlines changed or removed to either:

- (a) upgrade to Red Flag Warning**
- (b) cancel the Watch**

...FIRE WEATHER WATCH FOR MONDAY (TOMORROW) FOR NORTHEAST VERMONT FOR STRONG WINDS AND LOW HUMIDITY...

...FIRE WEATHER WATCH IN EFFECT MONDAY AND TUESDAY FOR NORTHERN NEW YORK FOR STRONG WINDS AND LOW HUMIDITY...

Again, with the issuance of a Watch, **a separate short statement under the ALBRFWBTW PIL will be issued.** This product will describe, in more detail, the area (specific counties), reasons and timing of the Watch.

**An example of a Fire Weather watch and associated forecast follows on pages 16 and 17:**

# 1. Example of a Fire Weather Watch and associated Fire Weather Forecast

WWUS81 KBTV 082000  
RFWBTV

FIRE WEATHER WATCH  
NATIONAL WEATHER SERVICE BURLINGTON VT  
400 PM EDT TUE APR 8 2008

NYZ028-035-VTZ001-002-005-009-091200-  
/O.NEW.KBTV.FW.A.0001.080410T1200Z-080411T0100Z/  
EASTERN CLINTON-EASTERN ESSEX-GRAND ISLE-WESTERN FRANKLIN-  
WESTERN CHITTENDEN-WESTERN ADDISON-  
400 PM EDT TUE APR 8 2008

...FIRE WEATHER WATCH IN EFFECT THURSDAY FOR THE CHAMPLAIN VALLEY DUE TO  
STRONG WINDS AND LOW HUMIDITIES...

THE NATIONAL WEATHER SERVICE IN BURLINGTON HAS ISSUED A FIRE WEATHER WATCH  
FOR STRONG WINDS AND LOW HUMIDITIES ACROSS THE CHAMPLAIN VALLEY OF VERMONT  
AND NORTHERN NEW YORK...WHICH IS IN EFFECT FOR THURSDAY.

A DRY AIRMASS WILL BE IN PLACE ACROSS THE AREA WEDNESDAY AFTERNOON INTO  
THURSDAY EVENING...WITH HIGH PRESSURE TO OUR EAST. WINDS ARE EXPECTED TO BE  
FAIRLY LIGHT...10 MPH OR LESS...THROUGH WEDNESDAY EVENING.

ON THURSDAY...SOUTH WINDS WILL INCREASE TO AROUND 30 MPH...WITH RELATIVE  
HUMIDITIES OF LESS THAN 30 PERCENT. COMBINED WITH THE LACK OF RAINFALL THE  
PAST 2 WEEKS...THESE WEATHER CONDITIONS ARE POTENTIALLY SERIOUS IF ANY FIRES  
DEVELOP.

AN UPDATE ON THIS SITUATION WILL BE ISSUED BY THE NATIONAL WEATHER SERVICE IF  
CONDITIONS CHANGE SIGNIFICANTLY.

PLEASE RELAY THIS INFORMATION TO ALL FIRE FIELD CREWS.

A FIRE WEATHER WATCH MEANS THAT CRITICAL FIRE WEATHER CONDITIONS ARE FORECAST  
TO OCCUR. LISTEN FOR LATER FORECASTS AND POSSIBLE RED FLAG WARNINGS.

\$\$

FNUS51 KBTV 082000  
FWFBTV

FIRE WEATHER PLANNING FORECAST...UPDATED  
NATIONAL WEATHER SERVICE BURLINGTON VT  
400 PM EDT TUE APR 8 2008

...FIRE WEATHER WATCH ON THURSDAY FOR THE CHAMPLAIN VALLEY FOR STRONG WINDS  
AND LOW HUMIDITY...

.DISCUSSION...

HIGH PRESSURE TO OUR EAST WILL RESULT IN A DRY AIRMASS IN PLACE ACROSS NEW  
ENGLAND AND NORTHERN NEW YORK THROUGH THURSDAY. AS THE HIGH MOVES SLOWLY  
EAST...SOUTH WINDS WILL INCREASE TO AROUND 30 MPH THURSDAY. A COLD FRONT WILL  
MOVE ACROSS THE REGION THURSDAY NIGHT WITH WINDS SHIFTING TO THE NORTHWEST.

VTZ001-002-005-009-016>018-NYZ028-035-091000-  
EASTERN ADDISON-EASTERN CHITTENDEN-EASTERN CLINTON-EASTERN ESSEX-EASTERN  
FRANKLIN-GRAND ISLE-WESTERN ADDISON-WESTERN CHITTENDEN-WESTERN FRANKLIN-  
400 PM EDT TUE APR 8 2008

...FIRE WEATHER WATCH FOR THURSDAY...

	TONIGHT	WED	WED NIGHT	THU
CLOUD AMOUNT	PT CLDY	PT CLDY	PT CLDY	MO CLDY
PRECIP CHC (%)	10	10	20	20
PRECIP TYPE	NONE	NONE	NONE	NONE
MAX/MIN TEMP	65	92	70	82
20 FT WND AM (MPH)		S 08		S 25
20 FT WND PM (MPH)	S 10	S 11	SW10	S 30
PRECIP AMOUNT	0	0	0	0
PRECIP DURATION	0	0	0	0
PRECIP BEGIN	--	--	--	--
PRECIP END	--	--	--	--
HUMIDITY (%)	65	35	50	25
HAINES	--	4	--	4
LAL	1	1	1	1
MIXING HGT/DISP	NONE/EX	7000	NONE/GD	5000
TRANSPORT WIND	-- --	S 12	-- --	S 30
VENTILATION RATE	--	210000	--	100000
REMARKS...NONE				
\$\$				

ETC

## **D. Red Flag Warning Product**

**ISSUANCE:** Red Flag Warnings are issued via the RFW pil...(ALBRFWBTV)...using the UGC zone code.

**Note:** Starting this season (2008), **Red Flag Warnings and Fire Weather Watches will now be broadcast on NOAA Weather Radio.**

If an RFW is issued, an updated routine fire weather forecast (FWF) is required with the Red Flag Warning and reason for the warning as a headline. The Red Flag Warning is used to warn of an impending or occurring Red Flag Event. It is issued when there is a high degree of confidence (70 percent or greater) that both fuel and weather parameters will meet Red Flag criteria within **36 hours**. If a Red Flag Warning is issued, this should be included in the highlights section of the area forecast discussion.

Per NWS Directives 10-401 and per request of both our **Vermont** and **New York Fire Weather Users**, they shall be called, 7 days a week by 6:00 AM, **before** a Red Flag Warning is issued.

**In Vermont**, call *Tess Greaves*. **Section VIII of this manual has a list of telephone numbers for the appropriate officials.** If you are unable to reach her, then just issue the appropriate product, and contact her as soon as possible.

**In New York**, our primary instructions are to call the *NY State Forest Rangers Dispatch* (24/7) in Ray Brook, NY. Call this facility before issuing a Red Flag Warning (see **Section VIII for phone numbers**). If you are unable to reach them, issue the appropriate product and contact them as soon as possible.

After issuance of a Red Flag Warning, and notification of our users, Steve Marien at the Eastern Area Geographical Area Coordination Center (612-713-7300) should also be notified.

Vegetative stage must be evaluated before issuing a warning. The Vermont Department of Forests Parks and Recreation will provide meteorological and fuel moisture information to us when critical. Since fuel moisture changes gradually, this data can be used by the midnight fire weather forecaster, over periods of time.

The forecaster can call Tess Greaves in Vermont or Joseph Kennedy (or the Dispatch Center) in New York (refer to section VIII Fire Weather Contacts) between 730 AM and 430 PM Monday through Friday for consultation. At other times and during an emergency, they can be called at home.

If, during the day, the forecaster decides that an unanticipated need for a Red Flag Warning exists, **first call our primary Vermont and New York Fire Weather Contacts. Discuss the**

**situation.** Once a decision is reached, issue an ALBRFWBTB statement to alert users of the situation. Also issue an updated ALBRFWBTB with the Red Flag Warning highlighted. An **unanticipated** Red Flag Warning means that fire weather users may already be in the field and unaware of the situation. The last issuance they received may have been the early morning ALBRFWBTB. That's why it's important to communicate with the key fire weather contacts.

Note: In some synoptic situations, weather conditions meeting warning criteria may exist for portions of a two day period, with only a break of several hours where red flag criteria are not met. In these situations, it is less confusing for fire agency customers if a Red Flag Warning or Fire Weather Watch is issued for the entire period, as opposed to issuing and cancelling warnings and watches each time weather conditions go into and out of warning criteria. If a Red Flag Warning or Fire Weather Watch is issued in this fashion, the discussion portion of the warning must contain explicit information regarding the short term periods(s) when critical conditions will subside.

As a note of interest, Joe Kennedy has stated that the fuel moisture should be very similar in Vermont and New York. He said that we would be most likely to issue a Warning for the Champlain and St Lawrence valley regions of New York, and less likely for the Adirondacks. This is due to differences in the type of fuel moisture and the cooler temperatures in the Adirondacks.

**Mr. Kennedy also stated that there are many times we have strong winds but no fires.** He said that **the 2 most important factors (in his opinion) for fire weather are:**

- number of days without rain (relates to fuel moisture), and**
- nights without the temperature reaching the dew point (no wetting dew)**

**Example of a Red Flag Warning (RFW) and associated routine FWF) forecast is on pages 20 and 21.**

# 1. Example of Red Flag WARNING and Associated Fire Weather Forecast

WWUS81 KBTV 091015  
RFWBTV

RED FLAG WARNING  
NATIONAL WEATHER SERVICE BURLINGTON VT  
615 AM EDT WED APR 9 2008

...RED FLAG WARNING FOR THE CHAMPLAIN VALLEY TODAY DUE TO STRONG WINDS AND  
LOW HUMIDITY...

NYZ028-035-VTZ001-002-005-009-100130-  
/O.NEW.KBTV.FW.W.0001.060410T1400Z-060411T0000Z/  
EASTERN CLINTON-EASTERN ESSEX-GRAND ISLE-WESTERN FRANKLIN-  
WESTERN CHITTENDEN-WESTERN ADDISON-  
615 AM EDT WED APR 9 2008

...RED FLAG WARNING IN EFFECT FROM 10 AM TO 8 PM EDT TODAY...

THE NATIONAL WEATHER SERVICE IN BURLINGTON HAS ISSUED A RED FLAG  
WARNING FOR THE CHAMPLAIN VALLEY OF VERMONT AND NORTHERN NEW  
YORK...WHICH IS IN EFFECT FROM 10 AM TO 8 PM EDT TODAY FOR STRONG WINDS AND  
LOW HUMIDITIES.

IT WILL CONTINUE VERY DRY TODAY...WITH RELATIVE HUMIDITIES OF 25  
PERCENT...AND WINDS WILL BE SOUTH AT AROUND 30 MPH. THESE CONDITIONS  
COMBINED WITH THE LACK OF RAIN OVER THE PAST 2 WEEKS...WILL RESULT IN  
SERIOUS CONDITIONS IF ANY FIRES DEVELOP.

WINDS WILL QUICKLY DIMINISH...AND RELATIVE HUMIDITIES WILL RISE...DURING  
TONIGHT.

PLEASE RELAY THIS INFORMATION TO ALL FIRE FIELD CREWS.

A RED FLAG WARNING MEANS THAT CRITICAL FIRE WEATHER CONDITIONS ARE EITHER  
OCCURRING NOW...OR WILL SHORTLY. A COMBINATION OF STRONG WINDS...LOW RELATIVE  
HUMIDITY...AND DRY FUELS WILL CREATE EXPLOSIVE FIRE GROWTH POTENTIAL.

\$\$

FNUS51 KBTV 091025  
FWFBTV

FIRE WEATHER PLANNING FORECAST  
NATIONAL WEATHER SERVICE BURLINGTON VT  
625 AM EDT WED APR 9 2008

...RED FLAG WARNING FOR THE CHAMPLAIN VALLEY TODAY FOR STRONG WINDS AND LOW HUMIDITY...

DISCUSSION...

HIGH PRESSURE WILL RESULT IN VERY DRY WEATHER TODAY AND SOUTH WINDS WILL INCREASE TO 30 MPH. A COLD FRONT WILL CROSS THE DISTRICT THURSDAY WITH WINDS SHIFTING TO THE WEST.

VTZ001-002-005-009-016>018-NYZ028-035-101000-  
EASTERN ADDISON-EASTERN CHITTENDEN-EASTERN CLINTON-EASTERN ESSEX-EASTERN FRANKLIN-  
GRAND ISLE-WESTERN ADDISON-WESTERN CHITTENDEN-WESTERN FRANKLIN-  
625 AM EDT WED APR 9 2008

...RED FLAG WARNING FOR TODAY...

	TODAY	WED NIGHT	THU
CLOUD AMOUNT	PT CLDY	PT CLDY	MO CLDY
PRECIP CHC (%)	20	20	50
PRECIP TYPE	NONE	NONE	SHOWERS
MAX/MIN TEMP	92	70	82
20 FT WND AM (MPH)	S 20		SW 15
20 FT WND PM (MPH)	S 30	SW15	W 15
PRECIP AMOUNT	0	0	.01-.10
PRECIP DURATION	0	0	1
PRECIP BEGIN	--	--	1 PM
PRECIP END	--	--	5 PM
HUMIDITY (%)	25	80	70
HAINES	4	--	4
LAL	1	1	4
MIXING HGT/DISP	7000	NONE/GD	5000
TRANSPORT WIND	S 30	-- --	NW 20
VENTILATION RATE	210000	--	100000
REMARKS...	NONE		
\$\$			
ETC			

## IV. The NFDRS Point Forecasts

The National Fire Danger Rating System (NFDRS) measures wildfire fire danger. The NWS role in NFDRS is that of forecasting weather parameters for input which when combined with fire weather community input (fuel moisture, etc) allows the NFDRS software to predict the next day's fire danger index.

NWS Burlington is responsible for inputting weather parameters (ALBFWMBTV) into the National Fire Danger Rating Forecast. **These forecast parameters are generally valid for the next day at 1300 LST, except some parameters (for example, max/min temperature and RH) are for a range of time. Per request of our users, NWS Burlington will generally issue this product by 2:30 PM. Updates are not required.**

Per Directives 10-401, a fire weather observation *must* be received for an NFDRS forecast to be generated. These site forecasts are currently issued for 4 Vermont locations, as well as for 5 sites in New York. The locations are as follows:

### VERMONT

#430501 - Essex Junction, VT (Chittenden county)

Elevation: 340 ft. 44.5078 N 73.1156 W

Owner: State of Vermont

Contact: Tom Simmons

#431301 - Sweezy (Mt. Tabor) (Danby), VT (Rutland county)

Elevation: 668 ft. 43.33 N 73.16 W

Owner: Green Mountain National Forest

Contact: William Garrison

#430601 - Lake Elmore, VT (Lamoille county)

Elevation: 1200 ft. 44.53 N 72.51 W

Owner: Green Mountain National Forest/Vt Forests and Parks

Contact: Keith Weaver

#430402 - Nulhegan (near Island Pond), VT (Essex county)

Elevation: 1243 ft. 44.79 N 71.7 W

Owner: U.S. Fish and Wildlife

Contact: Rick Vollick

## **NEW YORK**

- #300311 - Schroon Lake, NY (Essex county)  
Elevation: 820 ft. 43.8 N 73.77 W  
Owner: New York State Forest Rangers  
Contact: Joe Kennedy
  
- #300191 - Schuyler Falls, NY (Clinton county)  
Elevation: 650 ft 44.6 N 73.6 W  
Owner: New York State Forest Rangers  
Contact: Joe Kennedy
  
- #300892 - Brasher Falls, NY (St Lawrence county)  
Elevation: 300 ft. 44.8 N 74.8 W  
Owner: New York State Forest Rangers  
Contact: Joe Kennedy
  
- #300891 - Wanakena, NY (St Lawrence county)  
Elevation: 1500 ft. 44.1667 N 74.9 W  
Owner: New York State Forest Rangers  
Contact: Joe Kennedy
  
- #300312 - Mt VanHoevenberg, NY (Essex county)  
Elevation: 2000 ft. 44.22 N 73.89 W  
Owner: New York State Forest Rangers  
Contact: Joe Kennedy

**A. The FWM Forecast format is as follows:**

FCST,#####,YYMMDD,13,X,TT,RH,L1,L2,DD,SS,,TX,TN,RX,RN,P1,P2,F  
 where:

##### NFDRS Station Identifier {see above}  
 YYMMDD Year Month Day (**forecast valid date which is the next day**)  
           070605: June 5<sup>th</sup>, 2007  
 13 Time (forecast valid time 1300 hours/1PM). *Does not change.*

\*\* The double comma “,,” in the forecast line between SS and TX is needed to hold the place for *10 hour fuel moisture* values. The NWS does not forecast this however.

*The following parameters are valid at 1300 LST for the forecast valid date (next day):*

X Weather  
Codes: 0 - clear 5 - drizzle  
           1 - scattered clouds (mostly clear) 6 - rain  
           2 - broken clouds (partly-mostly cloudy) 7 - snow/sleet  
           3 - overcast 8 - showers  
           4 - fog 9 - thunderstorms

TT Dry Bulb Temperature  
 RH Relative Humidity  
 DD Wind direction (N, NE, E, SE etc)  
 SS Wind speed (10 minute average in MPH)

*The following parameters are valid for the 24 hour period ending at 1300 LST on the forecast valid date:*

L1 Lightning Activity Level (period 1400-2300 LST hours)  
Codes: LAL Level Coverage (%) Descriptor

1	0	None
2	1-14	Isolated
3	15-24	Widely Scattered
4	25-54	Scattered
5	55+	Numerous
6 (Dry lightning)	>=15	Widely Scattered or greater
	(little/no rain)	

L2 Lightning Activity Level (period 2300-2300 LST hours on forecast valid date)  
 TX Maximum temperature  
 TN Minimum temperature  
 RX Maximum relative humidity  
 RN Minimum relative humidity  
 P1 Precipitation duration (1300-0500 LST period) in whole hours  
 P2 Precipitation duration (0500-1300 LST period) in whole hours  
 F Wet Flag “Y/N” (only use Y for widespread heavy rainfall)

\*\*\*\* which weather codes set elements to zero and when to go with a wet flag = Yes \*\*\*\*

**1. Example of ALBFWMBTV - Point Forecast:**

ZCZC ALBFWMBTV ALL  
TTAA00 KBTW DDHHMM

NATIONAL FIRE DANGER RATING FORECAST  
NATIONAL WEATHER SERVICE BURLINGTON VT  
305 PM EDT WED JUN 4 2008

FCST,430501,080605,13,1,64,40,1,1,NE, 8,,65,50,90,40,0,0,N

**Remember...**the double comma “,,” in the forecast line above, between SS and TX is needed to hold the place for *10 hour fuel moisture* values. The NWS is not responsible for this parameter.

Guidance products used to develop these forecasts include, but are not limited, to the following sources:

- Numerical MOS guidance for nearby stations,
- Fire weather observations (Observation is REQUIRED per Directive 10-401),
- Current METAR and RAWS surface observations (via ROMAN), and
- Satellite and Radar imagery.

## V. Statements (ALBSPSBTV) And Other Public Products

It is NWS Burlington office policy, based upon user input, to refrain from issuing statements for “High, Extreme or Elevated Fire Danger” conditions. The Fire Danger is something that is calculated and posted each day at state and national parks. Their determination is based on local measurements, heavily leaning toward various fuel moistures. Media inquiries concerning the specific fire danger should be directed to the appropriate State Division of Forestry.

**Starting this season, (2008), Fire Weather Watches and Red Flag Warnings will be broadcast on NOAA Weather Radio (NWR). Fire Weather Watches/Red Flag Warnings are not highlighted in general Public Forecasts. On rare occasions, the fire weather community may request that we help get the word out about their fire danger calculations. In these rare cases, the senior Forecaster may decide to issue a statement, if requested by the forestry officials. This statement would incorporate portions or all of the information received from the fire weather community. *It is geared for NWR broadcast only. If a long-line SPS is issued, make sure the SPS is for 6 hours or less.***

## VI. Spot Forecasts

Site-specific (spot) forecasts are issued by WFOs in support of wildfire suppression and natural resource management. These forecasts aid the land management and fire control agencies in protecting life and property during wildland fires, hazardous fuels reduction, and rehabilitation and restoration of natural resources. Appendix E contains a list of the primary POC’s in the State of Vermont that are authorized to request SPOTs.

NWS Spot is the national standard software for requesting and issuing SPOT forecasts and should be used when possible. In times when the internet is hindered or not available, SPOT forecasts may be requested and disseminated through other mutually agreed upon methods. The forecast is a non-routine product. The forecast should state that it is valid until...[ Date and Time]. SPOT forecasts should be updated when they are unrepresentative of conditions.

Per NWS Directives 10-401, the NWS will provide site-specific (SPOT) forecasts upon request of any federal user agency to support land management activities associated with wildland fire (including prescribed burning). ***Provision of non-federal, non-wildlife SPOTs will be restricted to purposes directly related to protecting life and property; or whenever some aspect of federal resources are involved*** (i.e., personnel, equipment, or interagency protection agreements providing such involvement). ***SPOTs may also be issued for HAZMAT incidents*** upon customer request. Based on this, it is best to maintain contact with another Federal Agency (USFS, Military, etc) when requesting SPOTs.

Upon receipt of a request for a spot forecast (see appendix D), the first question to ask is:

### **“What type of fire is this, a Prescribed Burn or Wildfire?”**

Federal legislation still has limiting constraints on specialized aspects of the fire weather program for non-federal agencies that deal with non-wildfire activities. This includes, among other aspects, spot forecasts for non-federal prescribed burns.

--Spot forecasts for **wildfires in progress and other emergency situations** (i.e. affecting life or property) are available to *any federal, state or local* agency.

--Spot forecasts for **prescribed burns** are also available at any time *for federal agencies*. **State requested spot forecasts for prescribed burns will be honored where some aspect of federal resources are involved. It is recommended that state users make the request through their nearest federal agency.**

When the NWS receives a request for a SPOT forecast, both the forecaster and the agency making the request will need to determine the specific contents, frequency of issuance, be clear on means of distribution or communication and any other details required for a particular SPOT.

The user requesting the spot forecast will also, at a minimum, provide the following data: Location (town, county, state and latitude & longitude), topography and elevation, size of burn, ignition time and contact person with telephone number. Fuel (vegetation) type is also important information (stand of dense pines, or in a grassy field?).

In the spot forecast, the surface winds are generally the most important weather parameter, especially the timing of wind shifts. However, actual weather, humidity, transport winds, and temperatures may also be specifically requested. Each fire is different, presenting differing challenges with various requirements.

**Remember, exchange telephone and/or fax numbers** to share weather information.

**On site or reasonably close weather observations should be provided to the NWS with updated observations during the course of the event for issuance of a SPOT forecast.**

Minimum requirements for a weather observation should include:

- actual weather
- dry bulb temperature
- relative humidity
- surface wind speed and direction

If those elements are unavailable, and the forecaster feels that will negatively impact the forecast, he/she may decline to fulfill a formal spot forecast request.

**SPOT forecasts are considered one-time requests, and are *not* routinely updated.** Land management personnel may contact the appropriate WFO for a spot update if forecast conditions appear unrepresentative of the actual weather conditions.

## Example of Standardized SPOT forecast Format

The SPOT forecast will should follow this general format. The synopsis or discussion should key in on critical weather pattern and be brief. If it differs SIGNIFICANTLY from the routine fire weather forecast (FWF), the routine forecast should be updated as soon as possible. The updating of the ALBFWFBTV may be delegated out to whoever is available depending upon workload and resources.

FNUS7i KBTv DDHHMM  
FWSBTv

SPOT FORECAST FOR [LOCATION OR NAME OF BURN]  
NATIONAL WEATHER SERVICE BURLINGTON VT  
2 PM EDT TUE JUL 8 2008

VALID UNTIL [ ]  
IF CONDITIONS BECOME UNREPRESENTATIVE, CONTACT THE NATIONAL  
WEATHER SERVICE.

...HEADLINE...[RECOMMENDED BUT ONLY REQUIRED FOR FIRE WEATHER WATCH/RED FLAG WARNING]

DISCUSSION...[required]

**FIRST PERIOD** [SPECIFY, THIS AFTERNOON, TONIGHT, ETC]

SKY WEATHER.....

TEMPERATURE.....

HUMIDITY.....

20 FOOT WIND.....

OPTIONAL ELEMENTS AS REQUESTED BY USER

TIME (EDT)	9 AM	11 AM	1 PM	3 PM	5 PM
------------	------	-------	------	------	------

SKY (%).....

WEATHER COV.....

WEATHER TYPE.....

TEMP.....

RH.....

20 FT WIND.....

20 FT WIND GUST...

CHC OF PCPN (%)...

SMOKEY [YOUR NAME/INITIALS]

## Example of Standardized WFO Burlington SPOT forecast:

FNUS71 KBTV DDHHMM  
FWSBTV

SPOT FORECAST FOR DEVILS RIDGE FIRE...GREEN MOUNTAIN NATIONAL FOREST  
ISSUED BY NATIONAL WEATHER SERVICE BURLINGTON VT  
423 PM EDT SAT SEP 13 2008

VALID UNTIL 1223 AM EDT SUN SEP 14 2008  
IF CONDITIONS BECOME UNREPRESENTATIVE, CONTACT THE NATIONAL WEATHER  
SERVICE.

HIGH PRESSURE WILL MOVE OFF THE NEW ENGLAND COAST THIS AFTERNOON.  
INCREASING MOISTURE WILL MOVE NORTHEAST FROM THE OHIO VALLEY...AS A COLD  
FRONT DROPS SOUTHEAST ACROSS THE GREAT LAKES. THE FRONT WILL MOVE ACROSS  
THE FORECAST LOCATION EARLY SUNDAY AFTERNOON. THERE WILL BE A CHANCE OF  
SHOWERS TONIGHT...WITH STEADIER RAIN ON SUNDAY...TAPERING TO SHOWERS  
SUNDAY NIGHT. GUSTY WINDS TONIGHT WILL DIMINISH ON SUNDAY.

### FOR THE REST OF TODAY

SKY/WEATHER.....MOSTLY SUNNY (10-20%)  
CHANCE OF PCPN.....10 PERCENT  
BEGIN/END OF PCPN....NONE  
TEMPERATURE.....75 TO 80  
HUMIDITY.....40 TO 45 PERCENT  
20 FOOT WIND.....S 10 TO 15 MPH

TIME (EDT)	9 AM	11 AM	1 PM	3 PM	5 PM
SKY (%).....	10	15	18	18	20
WEATHER COV.....					
WEATHER TYPE.....	NONE	NONE	NONE	NONE	NONE
TEMP.....	65	71	75	77	79
RH.....	60	55	49	44	41
20 FT WIND.....	S 5	S 7	S 10	S 12	S 14
20 FT WIND GUST...7		9	12	12	15
CHC OF PCPN (%)...0		5	10	10	10

FORECASTERS NAME

## VII. Additional Fire Weather Information

### A. Fire Weather Observations

Fire weather observation stations provide the specialized observations to support fire weather forecasts, wildfire control and suppression, and various other land management operations. These stations may either be manned observation stations operated by the fire control agencies, or unmanned Remote Automated Weather Stations (RAWS) deployed by any of the federal or state land management agencies.

All weather observation stations are assigned a six (6) digit identification number. These are the same 6 digit identifier which would show up in the FWMBTV NFDRS point forecast product. The first two digits denote the state. For example;

VERMONT.....43  
NEW YORK.....30

The next 4 digits are utilized differently in Vermont and New York:

**In Vermont**, the second two (2) digits denote the county in which the station is located, thus Chittenden county is 05. The last 2 digits is the sequential number of stations (as they are added) in each county. Chittenden has 1 observation site so 01 is used. If an additional site is added to Chittenden county it would be assigned 02. Thus Observation site Essex Junction VT is 430501.

**In New York**, the middle 3 digits are the FIPS code, thus Essex county is 031. The remaining digit is the sequential number of stations (as they are added) in each county. Essex county NY has 1 observation site so 1 is used. If an additional site is added to Essex county NY, it would be assigned 2. Thus, observation site Schroon Lake (Essex county NY) is 300311.

If a new weather station is being deployed, users should contact the fire weather program leader for station ID assignment, who should in turn contact the ERH Fire Weather Program Leader to maintain consistency in methodology across the area.

In addition, these stations need to be provided a special forecast zone number if the owners wish to have the station catalogued with Weather Information Management System (WIMS). This is a 3 digit number which begins with a '9' (referring to Region 9 of the Forest Service Agency).

The Fire Weather Program is a cooperative effort between the National Weather Service and the federal, state, local and private fire control interests involved in the management of our timber and grasslands. Wildfire presents a serious threat. Accurate and timely weather information is one of the most important tools available to the land manager.

**Observations are the single most important effort the control agencies put into the fire weather program** because the product derived from these observations is the fire danger rating. Fire danger rating is the guidance tool that, together with the weather forecast, is used to make a variety of fire management decisions. It is important that observing agencies be well trained and informed of the necessity of accurate, timely, and representative observations. The goal is to effectively manage a natural resource. Questions on weather observations should be directed to the NWS Fire Weather Program Leader.

**Fire weather observations are to be transmitted in a *timely manner*.** Observations sent into the WIMS system are made available to the NWS computer system for access by fire weather forecasters. In addition, more observations are finding their way to the Internet every month. Users should make NWS forecasters aware of these observations.

The *owners and operators* of the fire weather stations are responsible for restocking of supplies for the daily operation of the station. They are also responsible for station inspection and quality control of the data.

The *NWS fire weather focal* is available for consultation on siting issues and for help in the correct method of taking a fire weather observation. Training is also the responsibility of the fire control agency, however the fire weather focal is available to assist upon request.

Special meteorological services are those services which are uniquely required by land management agencies, which require National Weather Service personnel to be away from their duty station and/or, in emergency situations to be on overtime. User agencies pay the costs for: overtime, travel and per diem (food and lodging, etc), and other miscellaneous costs pertaining to these special services.

Special services include: Mobile Unit and other on-site meteorological services, weather observer training, weather station visitation requested by user agencies, participation in user agency training activities.

Costs, to be recovered from user agencies, will be calculated on the basis of expense reports submitted to the NWS finance division, by the servicing NWS forecast office. Billing of user agencies will be handled by the appropriate NWS administrative divisions based on these expense reports. Bills include a statement of services rendered, and the dates and locations of these services.

#### **B. Incident Support, On-Site Services Equipment and Incident Meteorologists (IMETS)**

On-site forecast service is a non-routine service available from WFOs with designated Incident Meteorologists (IMETS). IMETS may be dispatched to support:

- a) Wildland or urban-wildland fires (including high risk or critical resource value prescribed burns.
- b) Land management coordination and dispatch centers, and Area Commands
- c) Hazardous substance releases
- d) Any special projects or incidents which fall under the mandate of the NWS

The NWS will provide on-site meteorological support upon request through the IMET program to: 1) federal land management agencies for wildland fire events, and 2) other government agencies involved in wildfire incidents. State and local fire fighting agencies involved in non-wildfire events (e.g., prescribed burning) may be supported depending upon available resources. Other events listed above (1b, 1c, or 1d) may be supported depending upon resources and approval by the appropriate Regional Headquarters and Meteorologist-in-Charge (MIC).

In case of competing resources, events requiring on-site services will be prioritized as shown below:

- a) Wildfire or a life threatening non-fire all hazards event
- b) Prescribed fires
- c) General public safety (non life threatening, not imminent)
- d) All others

The AMRS (All Hazards Meteorological Response System), theodolite equipment (now using ATMU designation), and FireRAWS are the main pieces of equipment used by IMETs (Incident Meteorologists). All are considered to be national fire fighting resources. The AMRSs are used to provide a mobile platform for data collection and forecast preparation. The theodolite is used to take winds aloft measurements at the site. FireRAWS provides on-site meteorological observation capabilities for the incident. Only trained personnel will operate the AMRS, and AMRSs will only be dispatched when a certified IMET is requested.

AMRSs are positioned at various WFOs around the country by the Staff Meteorologist to the NIFC (SMN) in coordination with the Regional Program Managers. ATMUs (Atmospheric Theodolite Meteorological Unit) are generally stored in interagency caches. Seasonal changes in the cache locations will be coordinated through NWS Regional Headquarters and the SMN. Units may be pre-positioned to caches anywhere in the country as fire danger requires.

Configuration and management of AMRSs and ATMUs will reside with the National Fire Weather Program Manager (NFWPM) and the Staff Meteorologist to the National Interagency Fire Center (SMN) in coordination with the Regional Program Managers.

Each Region will assign routine maintenance and restocking responsibility and property management for AMRSs and ATMUs to specific NWS offices. The MICs of these offices should ensure restocking and maintenance of the equipment is accomplished before the equipment is dispatched again. The SMN and NFWPM should ensure that caching agencies will

allow access to cached ATMUs by NWS staff for the purpose of restocking, maintenance, and training.

NWS Regional Headquarters should ensure there are a sufficient number of trained IMETs to meet normal requests for on-site services. Per NWS Directive 10-402, by March 1<sup>st</sup> the Regions will advise appropriate forestry officials/agencies of the following:

- a. Names and Locations of certified IMETS (and updated any status changes during the year) within each dispatch area.
- b. A 24 hour telephone number where the dispatch center can initiate the request for each IMET.

Availability of the IMET will be determined by the local MIC and the IMET. When an IMET knows in advance they will be unavailable (AL, station shortage, etc) the MIC and IMET will note this unavailable status on the IMET non-availability roster on the IMET website. Request and dispatch of IMETs and equipment should be accomplished through the National Resource Coordination

System Dispatch centers are responsible for providing logistical support to initial attack and project fires at the unit (Forest, Park, District, etc.) level. A dispatch center requests support from a Geographic Area Coordination Center (GACC). These centers act as focal points for internal and external requests not filled at the local dispatch centers. The **Eastern Area Coordination Center (EACC)** located in St. Paul, MN serves as this purpose and **may be reached at 612-713-7300**.

The National Interagency Coordination Center. NICC is responsible for coordinating movement of all resources between GACCs. NICC is located on the campus of the **National Interagency Fire Center (NIFC)**. The NIFC may be reached at **208-387-5512**.

An incident will initiate the request for an IMET from the WFO in their area. The request will be handled by a dispatch center. The local MIC is responsible for dispatching the IMET or notifying the center that the IMET is not available. If the local IMET is not available, the request goes to the SMN through the GACC. If the SMN is unable to find an available IMET then the request goes to the NICC. Non-land management IMET requests (HAZMET incident for Emergency Manager) will follow a similar request flow (refer to directives 10-402).

The MIC and IMET will follow the procedures below during a dispatch:

1. The MIC will inform Region and the SMN if the request is filled at the WFO level.
2. The IMET coordinates with the SMN and makes sure appropriate equipment has been ordered.
3. The IMET gets proper documentation: Overhead and Equipment Resource Orders, Travel Order, Travel Itinerary.
4. The IMET is responsible for shipping equipment.

5. The IMET prepares initial briefing and travels to fire.
6. Upon arrival at the site through completion of duty, the IMET follows the procedures set forth in NWS Directives 10-402, pages 7-11 including appendix A.

### C. Training:

#### Fire Behavior Courses:

The Fire Weather Program Leader (FWPL) will complete fire weather course numbers S-290 (Intermediate Wildland Fire Behavior) and S-591 (Fire Weather Forecasters Course). S-390 (Introduction to Wildland Fire Behavior Calculations) is recommended, but not required. In addition, the FWPL will acquire advanced knowledge of NFDRS, which can be accomplished through self study of S-491 course materials.

All weather forecasters involved in the fire weather forecast program are required to complete course number S-290 as well as the NWS Fire Weather based learning module.

All forecasters are also required to complete local training as specified by the local and/or regional Fire Weather Program Leader. This training should focus on: 1) the effects of local terrain on fire weather parameters and fire behavior, with an emphasis on wind; 2) local fire weather forecast techniques; 3) local fire season climatology; and 4) Remote Automated Weather Stations (RAWS) observations (where available). They should also become familiar with all NWS fire weather products and services and become proficient in the preparation and dissemination procedures for those products.

Training, certification and recertification procedures and requirements are outlined on pages 3 through 5 of NWS Directives 10-405.

### D. Communications:

Fire Weather products issued by the National Weather Service in Burlington are prepared on our AWIPS computer system. They are stored and then transmitted via NWS computers, passing through the NWS Gateway System where they are then directed to users of NWS products. Among these users are our fire management partners through WIMS. Other methods of dissemination include the NWS Family of Services. The daily fire weather forecast will also be available on the NWS Burlington homepage at:

<http://weather.gov> (and click on Vermont or northern New York)

or

<http://www.erh.noaa.gov/btv>

**\*\*\* Users should note, the Internet *is not* an officially endorsed means of communication by the NWS, thus there is no guarantee of timely delivery of products via this mode. \*\*\***

## VIII. Fire Weather Contacts

### A. VERMONT

#### Federal contacts:

Brian Schaffler  
USDA GMNF – Rochester District  
99 Ranger Rd.  
Rochester, VT 05767

email: [bschaffler@fs.fed.us](mailto:bschaffler@fs.fed.us)  
**Tel : 802-767-4163 X 518**  
**FAX : Unknown**

William Garrison - Forestry Technician  
Green Mountain and Finger Lakes National Forest – Manchester Ranger District  
USDA Forest Service  
2538 Depot Street  
Manchester Center, VT 05255

Email: [wgarrison@fs.fed.us](mailto:wgarrison@fs.fed.us)  
**Tel : 802-362-2307 x 228**                      **FAX : 802-362-1251**

Sandra Williams (dispatcher)  
Green Mountain National Forest  
231 N. Main St  
Rutland, VT 05701

email : [swilliams04@fs.fed.us](mailto:swilliams04@fs.fed.us)  
**Tel : 802-747-6737**  
**FAX : 802-747-6766**

Rick Vollick, Zone FMO  
Wallkill River NWR  
1547 County Road 565.  
Sussex, NJ 07461

email: [rick\\_vollick@fws.gov](mailto:rick_vollick@fws.gov)  
**Tel : 973-702-7266 X 19**  
**FAX : UNKNOWN**

**Vermont State contacts:**

Scott Pfister - Forest Resource Protection Chief  
103 So Main St.  
Building 10 South  
Waterbury, VT 05671-0602

Email: [scott.pfister@state.vt.us](mailto:scott.pfister@state.vt.us)  
**Tel: 802-241-3676**  
**Fax: 802-244-1481**

Tess Greaves (**Primary VT contact for NWS forecaster**)  
Vermont Dept. of Forests, Parks and Recreation  
29 Sunset Drive, Suite 1  
Morrisville, VT 05661

email: [tess.greaves@state.vt.us](mailto:tess.greaves@state.vt.us)  
**Tel : 802-888-5733**  
**FAX : 802-888-2432**

Nathan Fice – Bennington County Forester  
Vermont Dept. of Forests, Parks and Recreation  
478 Shaftsbury SP Road  
Shaftsbury, VT 05262

email: [nate.fice@state.vt.us](mailto:nate.fice@state.vt.us)  
**Tel : 802-375-1217**  
**Cell : 802-777-6891**

Barbara Farr - Director  
Dept. of Public Safety - Vermont Emergency Management  
103 South Main St.  
Waterbury, VT 05676-0850

email: [bfarr@dps.state.vt.us](mailto:bfarr@dps.state.vt.us)  
**Tel : 802-244-8721**  
**FAX : 802-241-5556**

**B. NEW YORK**

**State contacts:**

Captain John C. Strieff - Regional Forest Ranger  
NYS Department of Environmental Conservation (DEC)  
Route 86 PO BOX 296  
Raybrook, NY 12977  
Email: [jstrief@gw.dec.state.ny.us](mailto:jstrief@gw.dec.state.ny.us)  
**Tel : 518-897-1300**  
**FAX: 518-897-1370**

***New York State Forest Rangers Dispatch***  
***Ray Brook, NY (operations 24/7)... Primary contact for Red Flag issuances***  
***518-891-0235 otherwise contact Joe Kennedy***

Lt Ranger Robert Barstow  
NYS Department of Environmental Conservation (DEC)  
6739 U.S. Highway 11  
Potsdam, NY 13676

email: [rhbarsto@gw.dec.state.ny.us](mailto:rhbarsto@gw.dec.state.ny.us)  
**Tel : 315-265-3090**

Captain Robert Drew Cavanagh – Regional Forest Ranger  
NYS Department of Environmental Conservation  
State Office Building  
317 Washington St.  
Watertown, NY 13601

email: [r6info@gw.dec.state.ny.us](mailto:r6info@gw.dec.state.ny.us)  
**Tel: 315-785-2558**

Joseph Kennedy - State Forest Ranger **(Primary NY forest condition informational contact for NWS forecaster)**  
PO BOX 170  
Piercefield, NY 12973  
email: [kennedy@northnet.org](mailto:kennedy@northnet.org)  
**Tel : 518-359-7030**

**New York State contacts** (continued):

John Gibb – NY SEMO Director  
State Campus - Building 22 Suite 101  
Albany, NY 12226-2251  
**Tel: 518-292-2301**  
Email: [john.gibb@semo.state.ny.us](mailto:john.gibb@semo.state.ny.us)

Eric Day - Director  
Clinton County Fire Control and Emergency Services  
16 Emergency Services Dr.  
Plattsburgh, NY 12903

email: [DayE@co.clinton.ny.us](mailto:DayE@co.clinton.ny.us)  
**Tel : 518-565-4791 (ADM), 518-561-3370 (24 HR OPS)**  
**FAX : 518-565-4547**

Raymond Thatcher - Director  
Essex County Fire Control and Emergency Services  
PO BOX 217  
County Government Center  
Elizabethtown, NY 12932

email: [rthatcher@co.essex.ny.us](mailto:rthatcher@co.essex.ny.us)  
**Tel : 518-873-3660 (ADM), 518-873-6321 (24 HR OPS)**  
**FAX : 518-873-3663**

Malcolm Jones - Director  
Franklin County Fire Control and Emergency Services  
55 Bare Hill Rd.  
Malone, NY 12953

email: [mjones@co.franklin.ny.us](mailto:mjones@co.franklin.ny.us)  
**Tel : 518-483-2580 (ADM), 518-483-1219 (24 HR OPS)**  
**Sheriff's FAX : 518-483-3205**

**New York State contacts** (continued):

Michael Wassus - Director  
St. Lawrence County Fire Control and Emergency Services  
Emergency Operations Center  
48 Court St.  
Canton, NY 13617

email: [Mwassus@co.st-lawrence.ny.us](mailto:Mwassus@co.st-lawrence.ny.us)  
**Tel : 315-379-2240**  
**FAX : 315-379-0681**

Andrew Pohl – Fire Protection Specialist  
Department of State  
Office of Fire Prevention and Control  
41 State Street, 12<sup>th</sup> Floor  
Albany, NY 12231-0001

email: [ANDREW.POHL@dos.state.ny.us](mailto:ANDREW.POHL@dos.state.ny.us)  
**Tel : 518-474-6746**  
**FAX : 518-474-3240**

**C. COORDINATION CENTERS**

**Eastern Areas Coordination Center**

BHW Federal Building  
1 Federal Drive, PO Box 29  
Fort Snelling, MN 55111-4080

**Tel: 612-713-7300**

Normal hours of operation: 730 AM to 430 PM  
Primary Contacts: Steve Marien or Trudy Fagre

**National Interagency Coordination Center**

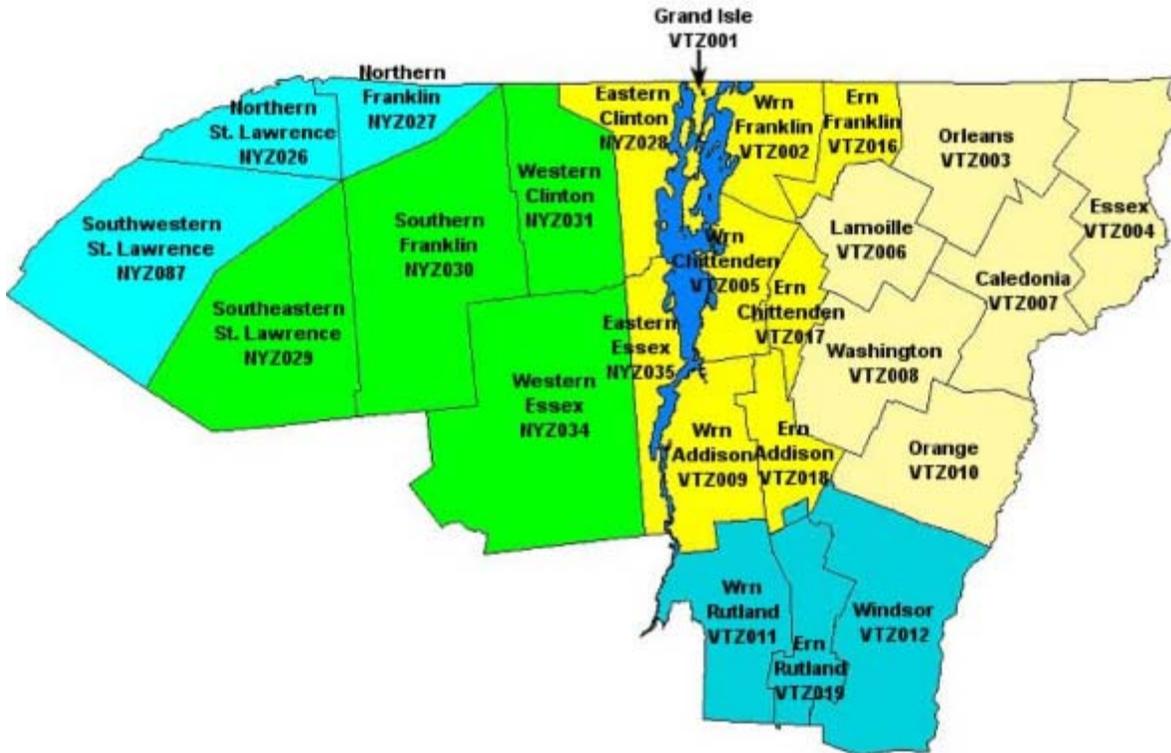
National Interagency Fire Center  
3833 S. Development Ave., Boise, Idaho 83705

Tel: 208-387-5050 or 208-387-5512

Appendix - A

# Burlington Fire Weather Zones

Remember, county names are used in the forecast, not area names.



Appendix - B

## **TERMS COMMONLY USED IN FIRE WEATHER FORECASTS**

Adiabatic (process): A thermodynamic change of state of a system in which there is no transfer of heat or mass (i.e. compression results in warming, expansion in cooling).

Adiabatic Chart: A thermodynamic diagram with temperature as abscissa and pressure as ordinate.

Advection: Transport of an atmospheric property solely by the mass motion of the atmosphere.

Air Mass: A homogenous mass of air, the properties of which can be identified as having been established while the air was situated over a particular region of the earth's surface.

Anabatic Wind: An upslope wind usually applied only when the wind is blowing up hill or mountain as the result of local surface heating, and apart from the effects of the larger scale circulation.

Anemometer: Instrument designed to measure the speed of the wind.

Anticyclone: A closed circulation of the atmosphere, of relative high pressure. (clockwise flow in the northern hemisphere).

Atmospheric Pressure: The pressure exerted by the air as a result of gravity. It is measured by the barometer, and expressed in millibars or inches of mercury.

Backing: A change of wind direction in a counter-clockwise direction (the opposite of veering); i.e. from west to south.

Blocking: Obstruction, on a large scale, of the normal west to east movement of highs and lows.

Calm: Absence of apparent motion of the air.

Climate: The statistical collective of weather conditions over a specified period of time (i.e. usually several decades).

Cloud: The visible aggregate of minute water droplets and/or ice particles in the atmosphere above the earth's surface.

Cold Front: The leading edge of a relatively cold air mass.

Complex: An area of low pressure within which more than one center is found.

Condensation: The physical process by which a vapor becomes a liquid.

Conduction: The transfer of energy within and through a conductor by means of molecular activity.

Contour: In meteorology, a line of constant height on a constant pressure surface map.

Convection: In meteorology, atmospheric motions that are predominantly vertical, i.e. usually means upward as opposed to subsidence (downward).

Convergence: Net horizontal inflow of air into a layer. If at the surface, vertical motion results. Associated with low pressure systems.

Coriolis Force: The deflecting influence of the earth's rotation on winds. Deflects winds to the right (with wind at your back) in the northern hemisphere.

Critical Fire Weather Pattern: Patterns that can quickly increase fire danger and trigger rapid fire spread.

Cumulus: A principal cloud type in the form of individual detached elements, sharp non-fibrous outlines, and vertical development.

Cumulonimbus: The ultimate growth of a cumulus cloud into a mushroom shape, with considerable vertical growth, usually fibrous ice crystal tops, and probably accompanied by lightning, thunder, hail and strong winds,

Cut off Low: A cold low which has become displaced to south, out of the basic westerly flow.

Cyclonic: Having a sense of counter-clockwise rotation about the local vertical.

Cyclone: A closed isobaric circulation in the atmosphere, with counter-clockwise rotation in the northern hemisphere.

Deepening: A decrease in the central pressure of a cyclonic, or low pressure system.

Dew Point: The temperature to which a parcel of air must be cooled to reach saturation.

Diffuse front: A front across which the wind shift and temperature change are weakly defined.

Divergence: Downward (subsidence) motion results. Associated with high pressure system.

Diurnal: Daily, especially pertaining to daily cycles of temperature, relative humidity and wind.

Drought: A period of moisture deficiency, extensive in space and time.

Dust Devil: A small but vigorous whirlwind, usually of short duration.

Extended Forecast: A forecast of general weather conditions for days 3 through 7.

Fair: A weather term implying no precipitation and no extreme conditions of clouds, visibility or wind.

Fire Danger: A subjective expression of an objective assessment of environmental (fuels and weather) factors which influence whether fires will start and how they may spread.

Fire Weather Watch: Issued when the forecaster feels reasonably confident that red flag conditions will develop in the next 12 to 48 hours.

Fog: Same as cloud except base of cloud is touching earth's surface.

Front: A transition zone between two air masses of different density.

Free Air: That portion of the atmosphere that is not modified by local influence.

Free Air Wind: The wind at the bottom layer of the atmosphere called free air, or just above the portion that is modified by local influences and friction approximately 1,000 feet above the earth's surface.

Friction Layer: The layer of air from the earth's surface to the geostrophic wind level or level of free wind.

Geostrophic Wind: A horizontal wind resultant of the balance of the Coriolis acceleration and the horizontal pressure force.

Gradient Wind: A horizontal wind velocity tangent to the contour line or isobaric surface resulting in a balance of the coriolis, pressure and centrifugal force.

Gravity Wind: A wind directed down a slope caused by greater air density near the slope than at the same height at a distance from the slope. (Also called drainage or downslope wind).

Gust: A sudden brief increase in wind speed.

Haines Index: A lower atmospheric stability and dryness index that can be one predictor of large fire growth due to plume dominated fires.

Headline: A brief statement at the beginning of a forecast that highlights dangerous or changing weather conditions.

Heat: Internal energy. A form of energy transferred between systems by virtue of a difference in temperature.

Heat Lightning: The luminosity observed from ordinary lightning too far away for its thunder to be heard.

Heat Low: An area of low pressure due to high temperatures (thermal low).

Heavy: In reference to precipitation, more than a half inch in forecast period.

High Pressure: An anticyclone. An area of atmospheric pressure with closed isobars and relative high pressure at its center. Air flows clockwise around a high.

High Clouds: Cirrus type clouds composed of ice crystals, usually above 20,000 feet.

Homogenous: In reference to an airmass having similar horizontal properties or elements.

Humidity: A measure of the water vapor content of the air.

Hygrothermograph: An instrument that records temperature and relative humidity as a function of time.

IMET: Incident Meteorologist (IMET): A meteorologist trained and certified to provide on-site weather forecasting support to an incident management team at a fire or other incident.

Instability: A property of the steady state of a system such that certain disturbances introduced into the steady state will increase in magnitude.

Instability Line: A band of convective weather, i.e. squall line, a line of active thunderstorms.

Inversion: An increase in temperature with height, i.e. a departure from the usual decrease of temperature with increase of altitude.

Isobar: A line passing through points having equal atmospheric pressure.

Isopleth: A line passing through points having equal or constant values of a given gravity, with respect to either time or space.

Isolated: Affecting less than 20% percent of the area.

Jet Stream: Relatively strong winds concentrated within a narrow stream in the atmosphere.

Katabatic wind: A wind blowing down an incline. If warm, it is called a foehn or chinook. If cold, its called a gravity or mountain wind.

Key Station Forecast: A forecast that takes into account an observing station location and the microscale effects on weather parameters in presenting exact values of weather parameters rather than ranges.

Knot: The unit of speed in the nautical system; a nautical mile per hour. It is equal to 1.15 statute miles per hour.

Lapse Rate: The rate of change of temperature with height. The moist lapse rate is 3.5 degrees per 1000 feet and the dry lapse rate is 5.5 degrees per 1000 feet.

Lee Trough: A low pressure trough formed on the lee side of a mountain range across which the wind is blowing at nearly right angles.

Light Precipitation: Precipitation, ranging from .11 to .20 inches in a forecast period.

Lightning: All the various visible electrical discharges produced by thunderstorms. It can be cloud to cloud, cloud to ground, or cloud to air.

Lightning Activity Level (LAL): An objective rating system used in the NFDRS that indicates the amount of cloud to ground lightning observed or forecast in a given area.

Local Winds: Winds, which over a small area, differ from those appropriate to the general pressure distribution.

Long Range: An extended forecast for a period greater than 5 days.

Long Wave: A wave in the major belt of westerlies which is characterized by large length and significant amplitude.

Low: An area of low atmospheric pressure having closed isobars. Used interchangeably with cyclone.

Low Aloft: An upper level cyclone (low pressure system).

Major Trough: A long wave trough in the large scale pattern of the upper air.

Marine Layer: A shallow layer of air with relatively high humidity and cooler temperatures that moves from the ocean over land. It may be associated with diurnal land/sea breeze regimes or other features that increase on-shore pressure gradients.

Mesoscale: A scale that ranges in size from a few kilometers to about 100 kilometers.

Meteorology: The study of the phenomena of the atmosphere.

Microscale: A scale that covers phenomena smaller than those in the mesoscale range.

Middle Clouds: Clouds of the altocumulus or altostratus family, anywhere from 7,000 to 25,000 feet in elevation.

Minor Trough: A pressure trough in the upper air of smaller scale than a long wave trough. It usually moves rapidly, i.e. short wave.

Mixing Height: Maximum depth to which mixing will occur.

Model Output Statistics: A generation of point specific output from a numerical model.

Moderate Precipitation: Precipitation, ranging from .21 to .50 inches in a forecast period.

Mountain and Valley Winds: Diurnal winds along the axis of a valley, blowing uphill and valley during the day and downhill and down valley during the night.

National Fire Danger Rating System (NFDRS): A national system used by all land management agencies to assess fuels, weather and fire potential on a daily basis during fire season.

Neutral Stability: The state of a parcel of air, which if displaced vertically, will experience no buoyant acceleration.

Normal: The average value of a meteorological element over a period of years, usually 30 in the United States.

Occasional: Occurrence of a meteorological element at infrequent intervals and for short duration.

Orographic: Of, pertaining to, or caused by mountains.

Overcast: A cloud layer that covers most, or all of the sky.

Overrunning: Condition existing in which an air mass is in motion aloft above another air mass of greater density at the surface.

Persistence: The tendency for the occurrence of a specific event to be more probable, at a given time, if that same event has occurred immediately preceding the time period.

Polar Front: The semi-permanent, semi-continuous front separating air masses of polar and tropical origin.

Precipitation: Any or all the forms of water particles, liquid or solid, that fall from the atmosphere and reach the ground.

Prescribed Fire/Burn: A natural or human ignited fire burning under a strict set of predetermined conditions to fulfill specified land management objectives.

Pressure Center: The center of a high (anticyclone) or low (cyclone) pressure system.

Prevailing Wind Direction: The wind direction most frequently observed during a given period.

Probability: The chance that a prescribed event will occur.

Probability Forecast: A forecast of the probability of occurrence of one or more of a mutually exclusive set of weather contingencies, as distinguished from a series of categorical statements.

Prognostic (Prog) Chart: A chart depicting some meteorological parameter at a specified future time.

Pseudo-adiabatic (chart): A thermodynamic chart (process), same as adiabatic, but with saturation adiabats added.

Psychrometer: An instrument used for measuring the water vapor content of the air.

Quasi-Stationary Front: A front which is stationary, or nearly so.

Radiation: The process by which electromagnetic radiation is propagated through free space.

Radiational Cooling: The cooling of the earth's surface suffers a net loss of heat due to terrestrial cooling.

Radiosonde (RAOB): Balloon-borne instrument for the measurement and transmission of temperature, humidity and pressure. When tracked by radar, also provides wind direction and velocity (Rawin).

Red Flag Criteria: A locally determined set of criteria that expresses environmental and meteorological conditions that would provide for fire starts and rapid, dangerous fire spread.

Red Flag Warning: A warning issued by the forecasters when red flag criteria are met or expected to be met within 12 to 24 hours. The warning highlights weather of particular importance to fire behavior and potentially extreme burning conditions or many new fires. Red flag warnings should always be coordinated with the customer.

Relative Humidity: (Humidity) - The ratio of the actual amount of water vapor in the air to the possible amount at that temperature.

Retrograde: Usually used to denote the movement of a weather system in a direction opposite to that of the normal flow in which the system is embedded.

Ridge: An elongated area of relatively high atmospheric pressure.

Saturation: The condition in which the air contains all the water vapor possible at that temperature, i.e. 100% relative humidity.

Sea Level Pressure: The atmospheric pressure at mean sea level.

Severe: Used in reference to thunderstorm intensity. Indicates strong winds and large hail.

Short Wave: (Minor Wave) - A progressive wave in the pattern of upper air motion with dimensions of cyclonic scale, as distinguished from a long wave.

Shower: Precipitation from a convective cloud, characterized by the suddenness with which they start, stop, and change intensity.

Smoke Management Parameters: The weather parameters used to forecast smoke dispersal (mixing height and transport winds).

Spot Weather Forecast: A specialized forecast issued by the National Weather Service for a localized area and time, at the request of the user.

Squall: A strong wind characterized by a sudden onset, of longer duration than gusts, and a rather sudden decrease in speed.

Stability Factor: This is determined by temperature differences between two atmospheric layers.

Stable: A property of the steady state of a system such that a disturbance introduced into the steady state will not increase in magnitude.

Storm: In meteorology, usually refers to cyclonic storms with considerable cloud and precipitation areas.

Stratiform: Descriptive of clouds of extensive horizontal development.

Subsidence: A descending motion of air in the atmosphere, of particular importance due to the heating and drying of the air as it contracts.

Surface Chart: An analyzed map showing the distribution of sea level pressure (isobars) and location of fronts and air masses.

Surface Pressure: The atmospheric pressure at a given location on the earth's surface.

Synopsis: A statement giving a brief general review or summary.

Temperature: The degree of hotness or coldness as measured on some definite temperature scale by means of various types of thermometers.

Thermal Belts: An area along the middle of a mountain slope that typically experiences the least diurnal variation in temperature and humidity, thus has the highest daily average temperature and the lowest relative humidity.

Thermal Low: (Heat Low) - An area of low atmospheric pressure due to high temperatures and intensive heating at earth's surface, usually stationary and have weak cyclonic circulation.

Thunderhead: Cumulonimbus or ice top cumulus.

Thunderstorm: A local storm produced by cumulonimbus clouds accompanied by lightning and thunder...often containing heavy rain...and sometimes strong winds and hail.

Topography: A detailed description of surface features including rivers, lakes, etc.

Tornado: A violently rotating column of air, pendant from a cumulonimbus cloud observed as a funnel cloud.

Towering Cumulus: The transitory stage of a cumulus into a cumulonimbus cloud.

Transport Winds: Winds in the lower mixed layer, used for smoke dispersal forecasts.

Tropical Cyclone: The general term for a cyclone that originates over the tropical oceans. The remnants of these storms occasionally recur and move into the mid-latitude westerlies, bringing considerable moisture with them.

Tropopause: The boundary between the troposphere and the stratosphere, usually characterized by an abrupt change to a small lapse rate.

Trough: An elongated area of relatively low atmospheric pressure, the axis of which is called a trough line.

Turbulence: A state of fluid flow in which the instantaneous velocities exhibit irregular and apparently random fluctuations.

Upper Air: Generally applied to levels above 850 mb (5,000 feet).

Upslope Wind: A wind directed up a slope during the hot part of the day.

Valley Wind: A wind which ascends a mountain valley during the day.

Ventilation Index: This is the product of the mixing height and transport wind speed, and is an indicator of dispersion potential.

Veering Wind: A change in wind direction in a clockwise manner, i.e. south to southwest to west, the opposite of backing.

Virga: Water or ice particles falling out of a cloud but evaporating before reaching the ground.

Visibility: The greatest distance it is possible to see permanent objects with the unaided eye.

Warm Front: A front that moves in such a way that warmer air replaces colder air.

Wave: A disturbance propagated by virtue of periodic motions in the atmosphere.

Weather: The state of the atmosphere, usually short term, with respect to its effects upon life, property and human activities.

Wetting Rain: Precipitation of .10 inches or more over most of the area specified.

Westerlies: The dominant west to east motion of the atmosphere across the mid latitudes.

Wet Bulb Temperature: The temperature an air parcel would have if cooled to saturation. It lies between the dry bulb temperature and the dew point temperature.

Whirlwind: A small scale rotating column of air (dust devil).

Wind: Air in horizontal motion relative to the surface of the earth.

Wind Direction: The direction from which the wind is blowing.

Zonal Flow: The flow of air along a latitude circle.

Zone Weather Forecast: A portion of the general fire weather forecast issued on a regular basis during the normal fire season specifically to fit the requirements of fire management needs. These zones or areas are a combination of administrative and climatological areas, usually nearly the size of an individual forest or district.

## Appendix - C

### NWS Burlington INTERNET

#### NWS Burlington Internet and other links

##### NWS Burlington Internet

The National Weather Service (NWS) in Burlington will continue to provide important information to the fire weather user community via a fire weather resource page. This page will reside on the NWS Burlington web site, which can be accessed through the following address:

<http://www.erh.noaa.gov/btv/> (then select Fire Weather from the menu)

The information can also be accessed through the following address:

<http://weather.gov/>

<http://www.weather.gov> (then click the appropriate state)

A wide range of elements are available on the fire weather resource page, which can assist the fire weather user with any decision making process. Topics include, but are not restricted to:

Local, Regional, and National Fire Weather Forecasts

Spot Forecast Information and Online Reporting Capabilities

Extended Weather Forecasts

Current Weather

Fire and Drought Indices

BTV Fire Weather Program

Precipitation/Drought Information

National Fire Information

Training Material

In addition, the Annual Operating Plan (AOP) will continue to reside on our web site. This will provide you with access to other administrative, technical, or operational information you may be seeking.

If you have any suggestions as to ways in which we can enhance our fire weather resource page, please do not hesitate to contact us. Our Internet contact point is Eric Evenson, and he may be reached via e-mail at [Eric.Evenson@noaa.gov](mailto:Eric.Evenson@noaa.gov) or by phone at 802-862-8711.

A few other sources/internet links of Fire Weather information include:

**Local and Regional links:**

<http://www.erh.noaa.gov/btv> : NWS, Burlington, VT Home Page

<http://www.erh.noaa.gov/aly> : NWS, Albany, NY Home Page

<http://www.erh.noaa.gov/box> : NWS, Taunton, MA Home Page

<http://www.erh.noaa.gov/gyx> : NWS, Gray, ME Home Page

**National Centers**

<http://www.boi.noaa.gov/fwx.htm>: National Weather Service (NWS), Boise, Idaho Fire Weather Page

[http://www.spc.noaa.gov/products/fire\\_wx](http://www.spc.noaa.gov/products/fire_wx): Storm Prediction Center, Norman, Ok (National Guidance).

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

<http://www.fs.fed.us/eacc>: Eastern Area Coordination Center

**International Centers**

<http://www.cifc.ca>: Canadian Interagency Fire Center

## Appendix - D

### **Instructions On How To Use Internet Spot Forecast Request Form**

From the Fire Weather Main Page on the National Weather Service Burlington (NWS BTV) web site, click on Internet Request Spot Form. The BURLINGTON, VERMONT SPOT FORECASTS page 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. Some of the features on this page include...

A) 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 to see how many spot forecasts were issued on a certain date. You can also move ahead or back on the calendar as well as clicking on a particular date to view information from that day. (This can help if you want to go back and provide feedback on a past spot forecast).

B) A map of the NWS BTV fire weather area of responsibility. A small box will appear indicating the location of the spot request. The box is colored coded to indicate if the spot forecast is pending (green), which means you have submitted the request and the NWS is working on the forecast. A purple box indicates the NWS has sent you a question with respect to the spot forecast. A red box on the map means the spot forecast is complete and you can either click on the red box or in the Name/Ignition Time/Status Box to see the forecast.

C) A link at the top of the monitoring page exists to take you back to the Burlington Fire Weather Page. So to submit a spot request online, simply click on SUBMIT A NEW SPOT REQUEST. You will now be taken to the BURLINGTON VERMONT SPOT FORECAST REQUEST page.

### **Information Page You Will Be Filling In**

\*\*\* It is important to note that the elements colored in red are required fields! \*\*\*

Let's look at the information fields on this page...

1 \_ Project Name: typically fires in the Western United States have names with respect to the river drainage basin they are in. If your fire has a name, go ahead and put it in. Otherwise, lets say the fire is 2 miles west of Essex, Vermont, go ahead and enter in 2W of Essex, VT. Or if the fire is on a mountain, you could put in the name of the mountain. Essentially put in something that you will be able to reference on the Spot Request Page because this is a required field.

\* select the type of project (either a wildfire or a prescribed burn. Do not worry about what WFU is). 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: The Requesting Agency name and phone number are required. Fax number and contact person are optional, but we consider those very important if we have any questions or a breakdown in dissemination capabilities. 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, assuming you use the same computer. Please note that no other people other than you and the NWS will see this information!

3 \_ Location: You have a couple of options on this one, but they are important with respect to having the location appear on the map. 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 (you can either specify degrees like 45.1486 or degrees/minutes/seconds like 45 13 34). For supplemental information you can reference the 7.5' USGS Quadmap, but you still need to provide the Lat/Lon. As of 4/8/02, the Legal Township/Range (T/R) section is mainly for locations in the Western Region of the National Weather Service, so inputting Lat/Lon information is the required method. The National Weather Service will be looking into this function for all areas in the country.

4 \_ Elevation: The top and bottom elevations of the fire are required. You can just enter the numbers and do not need to mention the word feet. 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 know it, you can enter it. For example if the fire is near East Mountain (near Rutland, Vermont), you could enter North Branch, for the North Branch river just south of East Mountain. Note that you will be flagged when submitting the request that if possible, we would like the drainage information. If you do not know it, go ahead and just submit the request anyway.

5 \_ Aspect: This field is required and important to know which side of a mountain the fire may be on. 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, ponderosa pine, etc. Also, if you can indicate the amount of fuel sheltering, it helps us tremendously in providing accurate wind forecasts.

8 \_ Observations: Although it is considered optional in the program, it is required to get a spot forecast from the NWS in Burlington. Please enter in the information with respect to the observation. For each observation we need to know where it is in relation to the burn, the elevation in feet, and the time (preferably using a 24 hour clock). The wind (in mph) can be specified as N12 Gust 25 or North at 10 for example. The temperature and wetbulb values (in

degrees F) should be entered and the RH (in percent) and Dewpoint (in degrees F) can also be entered if known. If you enter a temperature and wetbulb, the RH and dewpoint will be calculated for you on the next page. Finally, any remarks about clouds, weather, or other important information should be entered in the final box.

9 \_ Primary Forecast Elements: Not all spot forecasts are created equal, so we are asking you to tell us what are the forecast elements you need, or are particularly important. There are six parameters listed for you. Select which ones you want a forecast for, and for the time period(s) you would like as well (available times are Today, Tonight, and Tomorrow).

10 \_ Remarks: If a meteorological parameter is not listed and you would like to have Haines Index for example, enter that information in the Remarks section. You can also enter in information with respect to when you might want the forecast or any other information/input you can give to us with respect to the spot forecast request.

11 \_ Action: You now have three options. You can Submit Request, Cancel Request, or Clear Form. 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 (for example, if you forget to enter a name for the burn), while others will produce warnings and messages for your information. For example, even though drainage name is not required, it will still ask you if you know what it is. You do not have to answer this question. If an error is found, you will be taken to a page that describes the errors or minor problems. You can click on Go Back and Fix and have the opportunity to make the necessary changes. You can click on Submit Request Anyway, but more than likely we will probably be sending back a question or calling. You do have one more option and that is to Cancel Request.

### **Other Important Information**

\* 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. Detailed maps of the area around the burn are generated and displayed when they become available.

\* Once the forecast is COMPLETED and made available to you, the page will not update anymore. Thus if we have to update the forecast, we would be calling you to inform you of the upcoming change, since the page no longer updates or has a way to inform you that a change has been sent. When you go back into the forecast, the only way you might pick up on the changed forecast is at the top of the page it shows the time that the spot was requested and the time it was issued. The issue time will have changed. Keep in mind that "sensitive" information like your name, phone number, and the exact location of the burn are NOT visible to others \_ only to you and the NWS.

\* If we have questions about your request, we may send you back a question about it. If this happens, the Status Box will show the word QUESTION and the box on the map will turn purple. Click on this and you will see a big red box in the forecast page with our question. Usually there is some problem with the request that you can probably fix (use the CHANGE REQUEST link to do this, make your changes if necessary, then submit the request once again. The purple box will return to green and the word QUESTION will change back to PENDING) or you can call us.

\* 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.

\* At the bottom of the forecast page are links for actions that you can take. For example, you can go "Back to Spot List" to return to the monitor page. If you are on the same computer where you made the original request, you can click on "Change Request" to change the details of your request and then send the request again. This is what you would do if we send you a question and you need to change some information. If you need to delete a request, simply click on "Delete Request".

\* 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.

\* Invariably, something will go wrong at some point, and you might not be able to request or receive spot requests via the web page. In such cases, you can call in or fax us the spot forecast.

## Appendix – E

### Primary State of Vermont POC's for SPOT's

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## Appendix – E (cont'd)

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## Appendix - F

# Introduction to the National Digital Forecast Database

### What is the NDFD?

The NWS continues to make available a number of forecast grids of sensible weather elements (e.g., cloud cover, maximum temperature, etc). This database is called the National Digital Forecast Database or NDFD. National forecast graphics, such as temperature and probability of precipitation, produced from these grids, are made available with each forecast cycle. Additional parameters have been added in experimental stages, such as relative humidity. Additional fire weather parameters will be added in stages. Refer to the following URL:

[http://www.nws.noaa.gov/ndfd/resources/oper\\_status\\_table.pdf](http://www.nws.noaa.gov/ndfd/resources/oper_status_table.pdf)

The NDFD contains a seamless mosaic of NWS digital forecasts produced by NWS field offices working in collaboration to produce these timely forecasts. The database will be available to *all* customers and partners, allowing them to create a wide range of text, graphic, and image products of their own from the database. For additional information on the NDFD, check out the following URL's:

<http://weather.gov/ndfd>

<http://weather.gov/forecasts/graphical>

Below is an example of the Relative Humidity Graphical Forecast produced by NWS Burlington VT Forecast Office. Note the higher relative humidity in the mountains due to upslope flow and precipitation, with drier air in the St Lawrence and Champlain valleys (downslope flow).

