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WINTER HIGH WIND TORNADO & FLASH FLOOD VERIFICATION PROCEDURES

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SUMMARY OF REVISIONS: This supplement replaces National Weather Service Central Region Supplement 07-2003 dated October 10, 2008.

Winter storm, high wind, tornado and flash flood sections have been edited to reflect removing the requirement for local offices to submit preliminary, short term verification statistics.

Other minor changes and corrections were made.

(Signed By) _____ April 1, 2010
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1. Introduction 2
2. Winter Storm Warnings. 2
3. High Wind Warnings 3
4. Tornado Warnings..... 4
5. Flash Flood Warning..... 5

1. Introduction. The purpose of the verification programs for winter storms, high winds, tornadoes and flash floods is to assess National Weather Service (NWS) warning performance and identify areas for improvement in service to NWS customers.

This supplement will specify additional instructions which Central Region Weather Forecast Offices (WFOs) will follow for winter storm, high wind, tornado, and flash flood warning verification. For tornado and flash flood, preliminary statistics are produced to cover the period of time prior to Storm Data processing at NWS Headquarters (NWSH). In this supplement, statistics using Storm Data will be referred to as “quasi-final” since subsequent entries made into the Storm Data after the original processing can change these statistics. Quasi-final statistics will come from the Stats on Demand web site.

2. Winter Storm Warnings Stats on Demand is set up to generate either event specific or generic winter storm warning verification statistics as discussed in NWSI 10-1601, section 1.5 b. Central Region will use the generic version of winter storm warning verification to create the quasi-final winter storm statistics. Note that wind chill warnings are not included in the winter storm warning verification statistics.

Central Region Headquarters (CRH) will run quasi-final winter storm statistics from Stats on Demand each month.

Storm Data is filed up to 60 days after the end of the month. Central Region WFOs will follow NWSI 10-1605 for entering winter storm events in Storm Data. NWSI 10-1601, table 1, and NWSI 10-1605, sections 7.3, 7.22, 7.26, 7.28, 7.36, 7.47 and 7.48 provide guidance for determining winter events. In addition to these sections, WFOs should use NWSI 10-1601, section 1.5, subjective judgment, common sense, and integrity as guiding factors in determining winter storm events.

Some points WFOs should consider when deciding whether or not a winter storm event occurred:

- a. WFO criteria for events meeting winter storm warning thresholds can be found through links on the Intranet and in NWSCRS 02-2003, the Central Region Supplement to NWSI 10-513.
- b. WFOs should use quality assessed surface observations and reports from Local Climatological Data (LCD) site observers (see NWSI 10-1301, NWSI 10-1306 and NWSI 10-1311 for guidance) or cooperative observers (see NWSI 10-1307 and NWSI 10-1315 for guidance). Other types of snow depth observations or ice accumulation observations may be used if the WFO staff judges these to be an accurate estimation of what precipitation fell.
- c. If a warned zone has no snow or ice accumulation reports or observations, and the WFO suspects this zone did reach warning criteria, WFOs should work with NWS partners, such as emergency management or other government officials, to obtain reports for Storm Data.
- d. WFOs should consider life-threatening impacts for Storm Data entries. WFOs are free to consider whether or not the combination of elements, such as snowfall, ice accumulation, blowing snow, wind chill, etc., created a life-threatening hazard even though no single element by itself met warning criteria. These events should be entered in Storm Data as Winter Storm Events as per NWSI 10-1605, Section 7.47.
- e. Written instructions cannot address every situation. The final determination as to whether or not an event occurred, and should be included in Storm Data, will reside with the WFO Meteorologist in Charge (MIC).
- f. To help avoid missing significant events, WFOs should collect event data soon after each winter storm.

Like all event statistics, if new information becomes available after the storm data is certified and entered in Stats on Demand, new events should be added to the storm data monthly file. The file should be recertified and sent to NWSH.

For example, a WFO enters its statistics on February 15 for December's Storm Data. Newspaper articles, verifying a winter storm in December for five previously unverified counties, arrive at the WFO March 3. The Warning Coordination Meteorologist enters this data and recertifies the December Storm Data, March 5. The data becomes part of the Stats on Demand statistics the following day, March 6.

3. High Wind Warnings. CRH will run quasi-final high wind statistics each month from Stats on Demand.

Storm Data is filed up to 60 days after the end of the month. Central Region WFOs will follow NWSI 10-1605 for entering high wind events in Storm Data. NWSI 10-1605, sections 7.24 and 7.38 provide guidance for determining high wind events. In addition to these sections, WFOs

should use NWSI 10-1601 section 1.6, subjective judgment, common sense, and integrity as guiding factors in determining high wind events.

Some points WFOs should consider when deciding whether or not a high wind event occurred:

- a. WFO criteria for high wind warning thresholds can be found through links on the Intranet and in NWSCRS 06-2003, the Central Region Supplement to NWSI 10-515.
- b. WFOs should use quality assessed surface observations from Automated Surface Observing Systems (ASOS), Automated Weather Observing Systems (AWOS), or mesoscale networks meeting NWS standards (see NWSI 10-1302 for guidance). Other types of wind observations may be used if the WFO staff judges these to be an accurate estimation of what actually occurred.
- c. For zones with insufficient surface observations, WFOs should work with NWS partners, such as emergency management or other government officials, to obtain reports for Storm Data.
- d. Written instructions cannot address every situation. The final determination will reside with the WFO Meteorologist in Charge as to whether or not an event occurred and whether or not an event should be in Storm Data.
- e. To help avoid missing significant events, WFOs should collect event data soon after each high wind event.

Like all event statistics, if new information becomes available after Storm Data is certified and sent to NWSH, events should be added to the monthly Storm Data and this monthly Storm Data should be recertified and sent to NWSH.

For example, a WFO enters its Storm Data for September on November 15. Newspaper articles verifying a high wind event in September for three previously unverified counties arrive at the WFO November 21. The Warning Coordination Meteorologist enters this data and recertifies September's Storm Data, November 23. The data becomes part of the monthly statistics the following day, November 24.

4. Tornado Warnings. Central Region will use Stats on Demand to produce verification statistics for tornadoes. CRH will run Stats on Demand tornado statistics for the entire region shortly after the first of the month. CRH will post Central Region tornado statistics on the Central Region Intranet.

WFOs will enter Storm Data as per NWSI 10-1605. NWSI 10-1605 section 7.40 provides guidance for entering tornado information in Storm Data.

For preliminary tornado statistics using the Local Storm Report (LSR) event database, WFOs may add events to the database, based on damage surveys, which verify previously unverified tornado polygon warnings.

5. Flash Flood Warning. Central Region will use Stats on Demand to produce verification statistics for flash floods. CRH will run flash flood statistics, using Stats on Demand, for the entire region shortly after the first of the month. CRH will post Central Region flash flood statistics on the Central Region Intranet.

WFOs will enter Storm Data as per NWSI 10-1605, section 3. NWSI 10-1605 section 7.14 provides guidance for entering flash flood events in Storm Data.

Some points to remember are:

- a. Flash Flood is defined in NWSI 10-950, section 2.
- b. In an effort to estimate the timing of flash flood events more objectively and consistently, WFOs, in Central Region, should use the following methods and information. Although some subjectivity will remain, these actions should reduce ambiguity in determining when a flash flood began, or when a low-impact flood became life threatening. This, in turn, should facilitate better consistency in reports between offices and reporting periods.
 - 1) Flash flood events and their timing can be found in information provided by spotters, dispatch personnel, media, and other public officials;
 - 2) To help obtain the time of flash flood events, ask specific questions, such as those listed in NWSI 10-1605, section 7.14.3.
 - 3) Additional actions, which can be performed to determine when low-impact flooding became life threatening, include:
 - a) Use flash flood emergency 911 Natural Disaster Information Cards. Provide spotters with information cards and guidelines.
 - b) Use eSpotter or a similar application to obtain reports.
 - c) Train spotters to report the depth of water, whether or not the water is moving, the water's impact, and timing issues, if known.
 - 4) Perform storm surveys for flash flood events; interview people and ask for locations of frequently flooded areas, specific water impacts, and other information.

Where spotter, public or media information is lacking, use radar data, Flash Flood Monitoring and Prediction (FFMP), or other precipitation estimates to approximate the time period of intense rainfall. Then, estimate the lag time from the time of intense rainfall to the flash flood.

- 5) Urban areas will have a nearly instantaneous response (near zero lag time); flooding is likely during and immediately following the period of heaviest rainfall. In general, a rainfall rate of about one inch or more per hour may result in some degree of urban flooding. The same is true where soil type and/or soil conditions that render the surface impervious to absorption and percolation. The RFC Flash Flood Guidance (FFG) values are often useful guidelines for such situations.
- 6) In nonurban areas, a modest lag time may occur between the time of heaviest rainfall and the time creeks and streams rise over bank full, especially in relatively flat terrain.
- 7) Compare FFG values to radar estimates and other quantitative precipitation estimates (QPE) to approximate the beginning time of low-impact flooding (i.e., when QPE exceeds FFG).
- 8) Consider limitations to accurate radar estimates (e.g., high storm precipitation efficiency, hail contamination, etc.).
- 9) Based on terrain, basin characteristics, ongoing heavy rainfall, or the degree to which QPE exceeds FFG (e.g., by 0.5-1.0 inch or more); estimate the time of impact flooding.
- 10) In burn scarred areas, use the appropriate guidelines from the River Forecast Center (RFC) and partner agencies, such as the United States Geological Survey (USGS).