

NATIONAL WEATHER SERVICE

PRODUCT DESCRIPTION DOCUMENT (PDD)

TYPE: Enhancement to Official Product

DATE: November 30, 2012

Enhanced Product – Short-fused Convective Warnings and Associated Follow-up Statements

Modified: Enhanced Communication of Threats and Impacts via Bulleted Messages and Coded Tag Lines

Feedback Period: February 25 – November 30, 2013

Part 1 – Mission Connection

1) Product Description

The Tornado Warning (TOR), Severe Thunderstorm Warning (SVR) and any Severe Weather Statement (SVS) issued as a follow-up to a TOR or SVR, are alphanumeric products issued by NWS offices to provide short-fused warning information on hazardous conditions associated with intense thunderstorms which pose a threat to life and/or real property. In the case of the TOR, the warning forecaster also believes there is compelling evidence the subject storm will spawn one or more tornadoes. These products are prepared by each National Weather Service (NWS) Weather Forecast Office (WFO) for their County Warning Area (CWA) of responsibility.

The TOR is based on scientific evaluation of atmospheric conditions, or an actual observation, indicating tornado development is imminent or occurring. Hazards associated with severe thunderstorms are nearly always attendant to the tornado threat as well – those hazards being winds gusting to 58 mph or greater, and/or hail of one inch (1”) diameter or greater. The SVS is a “follow-up” statement which provides updated information as to the status of storms within a TOR (or SVR) warning area.

This product enhancement attempts to take a positive evolutionary step toward enhancing risk communication and focusing on impact-based information in NWS warnings. This represents the next logical step to address recent service assessment findings (see Purpose section below) and builds on the successful use of coded tag lines which have been appended to Central Region warnings since 2010. The goal of this experimental project is to enhance the communication of critical short fused warning information by utilizing streamlined, standardized, concise bullets. Additional enhanced wording will be included to convey information about associated impacts, specific hazards expected, and recommended actions - both within the bullet statements and as part of the tag line codes. Use of tags to explicitly include severity to prompt faster risk assessment by key users and partners also represents a partial migration to CAP compliant formats (minus a certainty expression).

For severe thunderstorms (SVR), forecasters will be presented two options within the WarnGen GUI: (1) a storm (or line of storms) may be identified as a traditional, baseline SVR threat, or (2) cells of interest may be identified as extreme storms, i.e., widespread wind gusts are predicted to exceed 80 mph and/or a storm with **confirmed** reports of 2” or larger hail affecting a populated area. Invoking the latter choice will trigger inclusion of enhanced verbiage concerning impacts and calls to action. It

will also insert a highlight statement such as "This is a particularly dangerous situation". Finally, the option to include a tag line which explicitly states "TORNADO POSSIBLE" will be available. This message highlights elevated danger that may be selected during the issuance of an original warning (SVR) or in a follow-up statement (SVS).

For tornado warnings (TOR), forecasters are provided three options. The first option uses bullets which plainly and clearly communicate hazard and impact information, calls to action rephrased by social science partners who have extensively studied recent tornado outbreaks in the Mid-South region, and tags which identify whether the tornado is observed or radar-indicated (implied statement of confidence in evidence), predicted hail size, and the option to add strength of non-tornadic thunderstorm-related wind. This warning is selected for cases in which there is credible evidence of a tornado.

The second option for a tornado warning – one for which there is substantial evidence of a significant tornado coincident with a high impact event – incorporates enhanced wording within the second warning bullet to identify a higher level of risk and promote serious urgency in taking action to seek shelter immediately. This warning contains the hazard tag line: HAZARD...DAMAGING TORNADO.

The third option is reserved for rare cases in which a known, violent tornado is approaching which is likely to experience devastating damage. For these situations, the enhanced wording includes a "TORNADO EMERGENCY" announcement and inclusion of "PARTICULARLY DANGEROUS SITUATION;" the recommended action will be brief, clear and extremely urgent (e.g., IF YOU ARE IN OR NEAR LIBERTY...SEEK SHELTER IMMEDIATELY!), and the hazard tag line will read: HAZARD...VIOLENT TORNADO

2) Purpose

The purpose of this experiment is to improve the communication of crucial decision support and risk assessment information to partners and users within the guidelines of governing policy and the existing operational environment. To this end, a set of Severe Thunderstorm and Tornado Warning templates will be employed to promote clarity of impacts and to more effectively communicate or escalate situational urgency. The proposed warning (and statement) templates each contain a simplified basis statement, a short description of the hazard as a companion to the event tags, information source, and a description of the potential impacts. In addition, when certain thresholds are met or anticipated for severe weather (such as a significant tornado or greater than 80 mph winds) a mechanism exists to issue a warning or statement with enhanced wording.

These modifications denote a meaningful progression in the NWS warning system. Further, they represent concrete actions to address findings and recommendations from recent historic tornado events. Among these recommendations were proposed enhancements to the warning system, including:

- providing a non-routine warning mechanism that prompts people to take immediate life-saving action in extreme events like strong and violent tornadoes
- warnings that are impact-based more than phenomenon-based for clarity on risk assessment,

- warnings more compatible with external local warning systems and emerging mobile communications technology
- warnings that are more easily understood and calibrated by the public to facilitate decision making
- diminish the perception of false alarms and their impacts on credibility

After extensive collaboration with social scientists who performed intense work in the wake of tornado episodes in the Mid-south region, most particularly the April 27, 2011 Super Outbreak, it is believed the enhancements identified in this PDD can be implemented immediately to begin the desired evolution toward a warning system which better communicates intensity, magnitude of risk, potential impact, and appropriate responsive actions.

3) Audience

The target audience for the product includes: national, state and local emergency managers; media partners; the private weather enterprise; government and military agencies.

4) Presentation Format

Enhanced wording concerning impacts, specific hazards and source of information which prompted the warning will be inserted into the text area beneath the third mandatory bullet (immediately following the time, location and motion of the storm).

A list of “recommended action” phrases will be selectable in the WarnGen GUI. The selection will be inserted into the mandatory section labeled “PRECAUTIONARY/PREPAREDNESSACTIONS”.

Relevant tags for Tornado, Hail and Wind will be automatically appended to the bottom of severe convective warnings (TOR, SVR) and follow-up statements (SVS).

5) Feedback Method

As a means of soliciting feedback regarding the quality, value and utility of this product, a formal customer survey can be accessed through the following URL:

<http://www.weather.gov/survey/nws-survey.php?code=Midsouthwarning>

Each participating office agrees to an evaluation period of ten (10) months, at which time feedback regarding this service enhancement will be reviewed for the purpose of determining whether to make the service a permanent part of the official product catalog, to make additional refinements and extend the experiment, or to discontinue it.

Part II – Technical Description

1) Format & Science Basis

Compelling evidence exists to support the capability of NWS forecasters to differentiate the strong/violent tornadoes from the less damaging tornadoes. Nationwide, 68% of NWS warnings for EF0-1 tornadoes achieve at least 12 minutes lead time (a metric of advance notice measured from warning dissemination to verified occurrence). However, the success rate for advance prediction of EF3-5 tornado warnings is substantially better (94%) as is the average lead time (18 minutes). There are clearly exceptions but, in general, performance metrics indicate a statistically significant skill in detecting and predicting catastrophic tornadoes as compared to all tornadoes.

The coded tag lines will be appended to the bottom of every TOR, SVR and SVS products after the double ampersand (&&) directly below the existing TIME...MOT...LOC line and before the double dollar sign (\$\$).

The enhanced wording designed to communicate severity, hazards, and impacts will be inserted into the third mandatory bullet section, which begins “AT <time> CDT...”

The tag lines will be appended to TOR, SVR and appropriate follow-up SVS products, after the double ampersand (&&) and the “Lat/Lon” and “Time/Motion/Location” lines, as follows:

<descriptor; optional for SVR>

TORNADO DAMAGE THREAT...<descriptor>

HAIL... x.xxIN

WIND...xxMPH <optional for TOR>

Where x.xx represents the expected maximum hail size in inches, and xx represents maximum expected thunderstorm-induced wind speed.

EXAMPLE – illustrating a TORNADO EMERGENCY:

BULLETIN - EAS ACTIVATION REQUESTED
TORNADO WARNING
NATIONAL WEATHER SERVICE JACKSON MS
232 PM CDT WED APR 27 2011

THE NATIONAL WEATHER SERVICE IN JACKSON HAS ISSUED A

* TORNADO WARNING FOR...

NORTHERN KEMPER COUNTY IN EAST CENTRAL MISSISSIPPI...

NOXUBEE COUNTY IN EAST CENTRAL MISSISSIPPI...

SOUTHEASTERN WINSTON COUNTY IN EAST CENTRAL MISSISSIPPI...

* UNTIL 330 PM CDT

* AT 231 PM CDT...A CONFIRMED LARGE...VIOLENT AND EXTREMELY DANGEROUS TORNADO WAS LOCATED 12 MILES SOUTHWEST OF NANIH WAIYA...AND MOVING NORTHEAST AT 50 MPH.

THIS IS A TORNADO EMERGENCY FOR LOCATIONS ALONG THE PATH OF THE TORNADO...TAKE COVER NOW.

THIS IS A PARTICULARLY DANGEROUS SITUATION!

HAZARD...VIOLENT TORNADO.

IMPACT...THIS IS A LIFE THREATENING SITUATION!
SEVERE DAMAGE TO BRICK HOMES AND COMMERCIAL STRUCTURES.
MOBILE HOME AND VEHICLE DESTRUCTION.
EXTENSIVE TREE AND POWER LINE DAMAGE.

* LOCATIONS IMPACTED INCLUDE...
PRESTON...NANIH WAIYA...MASHULAVILLE...MACON AND BROOKSVILLE

PRECAUTIONARY/PREPAREDNESS ACTIONS...

THIS IS AN EXTREMELY DANGEROUS AND LIFE THREATENING SITUATION! SEEK
UNDERGROUND SHELTER! IF NO UNDERGROUND SHELTER IS AVAILABLE SEEK
SHELTER IN AN INTERIOR ROOM OF THE LOWEST LEVEL OF A STURDY
STRUCTURE. ABANDON MOBILE HOMES AND VEHICLES.

&&

LAT...LON 3285 8835 3273 8891 3293 8891 3292 8896
3293 8897 3293 8913 3329 8868 3329 8830
TIME...MOT...LOC 1931Z 238DEG 45KT 3283 8907

TORNADO...VISUALLY CONFIRMED
TORNADO DAMAGE THREAT...SIGNIFICANT
HAIL...2.75IN

\$\$

In the above example, the warning includes tornado emergency and PDS wording, specific expectations of hazards and impacts, clarification of existence and severity of damage, and clear, simple protective action instructions. The tag lines indicate an existing catastrophic tornado and baseball-size hail associated with the storm.

Allowable Coded Tag Line Values

The allowable values for hail and wind tag lines are coded and defined as follows:

Tornado Values for TOR and TOR related SVS

TORNADO...RADAR INDICATED
TORNADO...RADAR CONFIRMED
TORNADO...VISUALLY CONFIRMED
TORNADO DAMAGE THREAT...CONSIDERABLE

For SVR/SVS the tornado tag line typically will not be appended. However when conditions warrant the option to identify possible tornado formation will be available in the form of the following tag:
TORNADO...POSSIBLE

Hail Values for TOR/SVR/SVS

(Flexibility is given to local offices to add other events with 0.75 being the lowest allowable specified value, other than “no hail” and “smaller than three-quarter inch” values. The lowest value of hail size considered to meet “severe thunderstorm” criterion is 1-inch in diameter.)

0.00	Equates to no hail
<.75	Small hail expected
0.75	0.75 inch hail (penny-sized)
0.88	0.88 inch hail (nickel-sized)
1.00	1.00 inch hail (minimal SVR criterion for hail size)
1.50	1.50 inch hail (ping pong ball-sized)
1.75	1.75 inch hail (golf ball-sized)
2.50	2.50 inch (tennis ball-sized)
2.75	2.75 inch hail (baseball-sized)
4.25	4.25 inch hail (softball-sized) or larger and is the highest allowable value

Wind Values for TOR/SVR/SVS

Units are in MPH. Flexibility is granted to add other events in 5 mph increments, but default template value choices are:

<50	Wind gusts below severe criteria and lowest allowable value (for SVR hail only)
60	60 mph peak wind gust and is the first allowable value above <50 (severe criteria)
70	Used for warnings where wind is expected to be GTE 70 mph but LT 80 mph
80	Used for warnings where wind is expected to be GTE 80 mph but LT 90 mph
90	Used for warnings where wind is expected to be GTE 90 mph but LT 100 mph
100	100 mph or higher peak wind gust and is the highest allowable value (significant structural damage)

2) Availability

This enhanced product is available through all distribution channels which currently disseminate TOR, SVR, and SVS warning products.

3) Additional Information

Service Assessments for the two most recent major flood and significant tornado events have identified social networks as increasingly popular mechanisms for confirming warning information and prompting reaction decisions. In both Alabama and Joplin, messages received via SMS text, Facebook, Twitter and the like, were found to amplify perceptions of risk and lead to warning response. Therefore, part of this project will also explore methods of utilizing social media more effectively – specifically through WFO RSS and Twitter feeds – in an effort to capitalize on the potential to heighten threat awareness, and perhaps motivate receivers to take prompt, protective action. A collaborative project with the societal impacts group at Mississippi State University will explore the effectiveness of this effort.