NATIONAL WEATHER SERVICE
PRODUCT DESCRIPTION DOCUMENT (PDD)

TYPE: Enhancement to Official Product
DATE: January 31, 2013

Enhanced Product – Graphical depiction of threats associated with severe thunderstorm warnings and tornado warnings.

Feedback Period: April 1, 2013 – March 30, 2014

Part I – 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 will graphically depict the area within severe thunderstorm warnings most at risk of hail 1.25 inches or greater in diameter, and the area within tornado warnings most at risk of a tornado. The graphics are based on the TIME…MOT…LOC "tag" found at the bottom of all severe thunderstorm and tornado warnings. An example of this "tag" follows:

TIME...MOT...LOC 2213Z 181DEG 34KT 3885 9746

This information, found in all severe thunderstorm and tornado warnings and their associated follow-up statements, specifies the location of the item of interest (potential hail or tornado) at a specific time as well as its forecast velocity. Utilizing this data, "plumes" with varying degrees of risk will be developed and plotted on a Google maps graphic embedded within a web page designed specifically for core partners who are responsible for risk management decisions.

Initially, this experiment will be limited to the five Central Region offices that participated in the original Impact-Based Warnings Demonstration. The area of

responsibility covered by those offices encompasses eastern Kansas and most of Missouri. Individual jurisdictions of the participating offices are depicted graphically in the image below. Specifically, they include the County Warning Area (CWA) of:

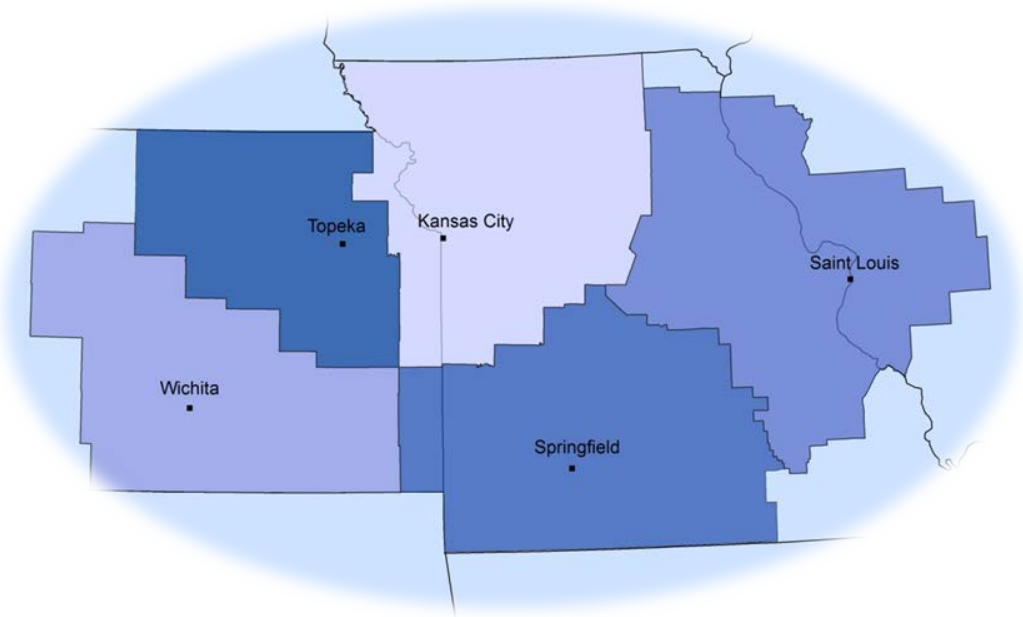
- WFO Kansas City/Pleasant Hill (EAX)
- WFO St Louis (LSX)
- WFO Springfield (SGF)
- WFO Wichita (ICT)
- WFO Topeka (TOP).

2) Purpose

The purpose of this experimental product is to allow partners to better understand and interpret specific threat information already transmitted in text warnings. Since this format may be easier to interpret than the standard "pathcast" feature, which is found in some severe thunderstorm and tornado warnings, it will allow officials to better prepare specific locals within these warnings of impending severe weather threats.

3) Audience

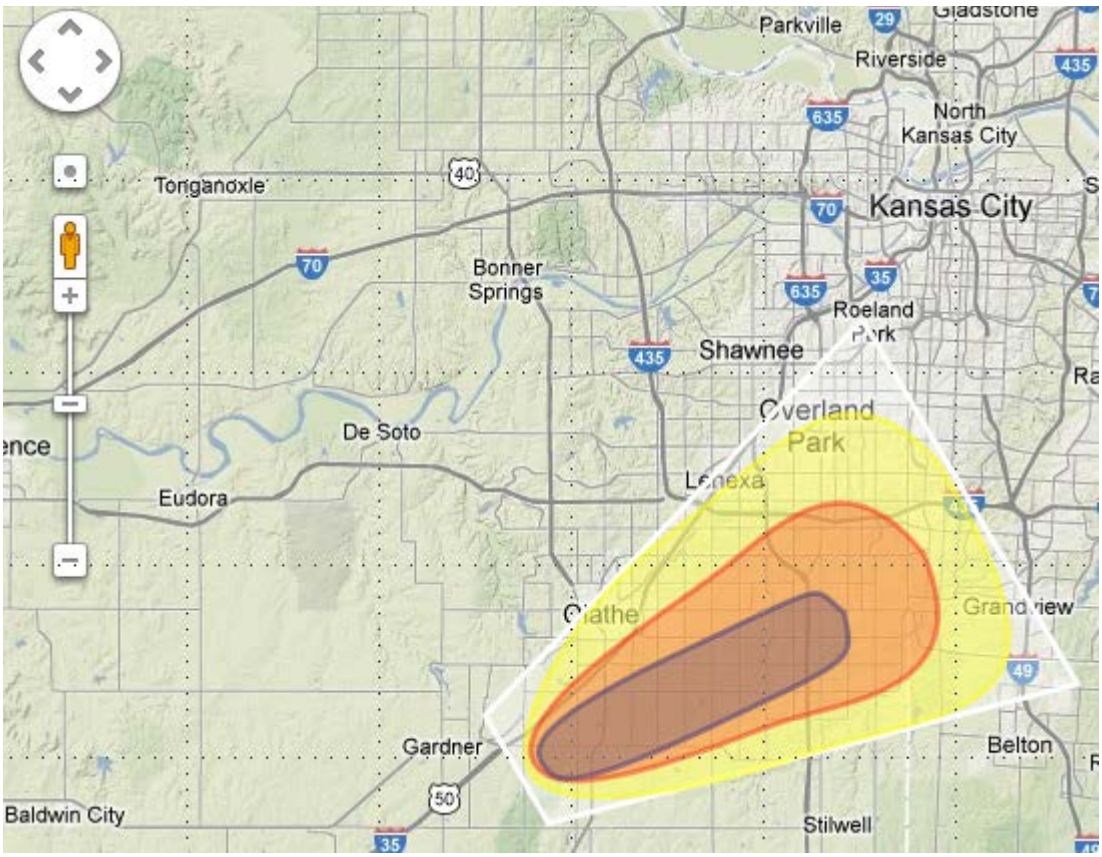
The target audience for the product includes: state and local emergency managers; media partners; the private weather enterprise; government and military agencies.



4) Presentation Format

Warning Plume relative probability information will be displayed graphically on a Google maps graphic embedded within a special web page hosted by each participating forecast office.

In the example below, yellow shading depicts lowest threat, orange depicts mid-range threat, and purple depicts the highest threat area. All shaded threat levels are contained within the warning polygon disseminated to, and seen by, the public.



From the perspective of statistical historical analysis, and the existing storm environment, the threat of a particular hazard is not equal at all points within a warning polygon. The likelihood of a tornado, for example, is statistically strongest for a fraction of the actual area warned. This experimental product attempts to quantify those probabilities and depict them graphically, in relative shades and terms, without expressly eliminating the possibility that any point within the warned area could exhibit the identified hazard and associated impacts.

This project represents a potentially significant service enhancement that addresses a priority recommendation shared by many emergency managers during the first year of IBW. A finding commonly expressed by those partners was that their decision-making would be improved substantially if NWS warning forecasters could refine the overall tornado threat by identifying the strongest probability of occurrence within a given warned area. It also addresses, to some degree, each of the six major risk characterization parameters, which IBW social science investigators found to be important in evaluating warning value (threat magnitude, timing, location, duration, history, and confidence).

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:

Insert URL here *(request pending)*

Each participating office agrees to an evaluation period of eight (8) 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

Severe weather plumes are determined using a climatological database populated by historical severe weather text warnings and severe weather reports. The warnings and reports are statistically analyzed to develop probabilistic grids for two sets of variable conditions; storm speed and forecast hail size/tornado potential. These elements are extracted from the text warnings.

Once the raw probabilistic grids are determined from the climatological database of warnings and reports, regression analysis is performed to smooth the data for presentation. A set of regression equations and grids are calculated for each forecast storm speed and hail size/tornado combination.

Following a “real-time” warning issuance the warning text is interrogated for the storm speed and forecast hail size/tornado information. Once this is determined the appropriate grid/plume and threat information is applied to the geographic location affected.