# Topeka News

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## Storm Surveys—Did You Know?

Tornadoes, large hail, and strong winds are all potential threats associated with severe thunderstorms that pass through northeast Kansas each year. A handful of these events are typically significant enough to warrant meteorologists from the National Weather Service in Topeka to come out and survey the damage.

**What events warrant a storm survey?** First, meteorologist attempt to survey all tornadoes, and all events where there may be some confusion if strong downburst winds or a tornado occurred. If damage is exceptional (potential EF-4 or EF-5 rated damage on the Enhanced Fujita scale), a national storm survey team, defined by the NWS as the *Quick Response Team (QRT)*, may travel to northeast Kansas to survey the damage. Second, events in which a death or injury occurred are typically surveyed. Third, events that cause significant monetary loss—whether it is due to large hail, damaging winds, tornado, or flooding may be surveyed. Finally, local emergency management or law enforcement may request that a representative from the National Weather Service conduct a survey. Meteorologists attempt to honor each of these requests.


*The NWS-Topeka Storm Survey vehicle.*

**What does a storm survey entail?** National Weather Service meteorologists typically travel to the survey site within 12 hours of the severe weather event. Anywhere from one to four meteorologists may conduct the survey. Should a widespread severe weather event impact the area, several small teams of two meteorologists may concurrently conduct surveys at different locations. Meteorologists speak with emer-

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## Warning Operations—How Does it All Work?

**By Meteorologist Brian Barjenbruch**

Have you ever wondered what exactly goes into the development of a severe thunderstorm or tornado warning? Perhaps it *seems* easy enough. You may think, if a trained storm spotter contacts the NWS with confirmation of a tornado, it would time to issue a warning—right? Absolutely! However, the goal of the NWS is to give *advanced* warning to those in the path of these dangerous severe weather phenomena. What then do NWS forecasters use to predict a tornado touchdown or baseball size hail long **before** anything even happens? Severe weather prediction typically occurs before thunderstorms even develop. In the days leading up to potential severe weather, forecasters examine weather observations from the ground to the stratosphere across the

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### *Special points of interest:*

- The Warning Process: What are meteorologists considering?
- New tornado safety guidance from the National Weather Service and American Red Cross
- New product available from NWS-Topeka
- News on WAS*IS: Weather Society Integrated Studies

### *Inside this issue:*

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# New Tornado Safety Guidance—
# A Joint Statement by American Red Cross and National Weather Service


NOAA's National Weather Service and the American Red Cross share a common goal of protecting lives through public education. **Regarding tornado safety, we both agree that the best options are to go to an underground shelter, basement or safe room.** We have been giving this advice for decades, and it is recognized as the most effective way to stay safe in a tornado.

The National Weather Service and Red Cross also agree on the critical importance of preparedness and quick action when conditions are right for tornadoes to develop like during a severe thunderstorm warning or tornado watch. When a tornado warning is issued, immediate action is required. Preparedness begins by identifying a safe location well in advance of any severe weather and having a way to get weather alerts wherever you are, such as from a NOAA weather radio. When a watch or warning is broadcast, people should already have a plan on what to do and where to go. They should take action immediately and never wait until they actually see a tornado.

***"Preparedness begins by identifying a safe location well in advance of any severe weather…"***

The National Weather Service and the Red Cross continue to agree that if no underground shelter or safe room is available, the safest alternative is a small windowless interior room or hallway on the lowest level of a sturdy building, such as an interior bathroom. We also recommend that residents of mobile homes go to the nearest sturdy building or shelter if a tornado threatens.

**The Red Cross and Weather Service believe that if you are caught outdoors, you should seek shelter in a basement, shelter or sturdy building. If you cannot quickly walk to a shelter:**

- **Immediately get into a vehicle, buckle your seat belt and try to drive to the closest sturdy shelter.**
- **If flying debris occurs while you are driving, pull over and park. Now you have the following options as a last resort:**
  - **Stay in the car with the seat belt on. Put your head down below the windows, covering with your hands and a blanket if possible.**
  - **If you can safely get noticeably lower than the level of the roadway, exit your car and lie in that area, covering your head with your hands.**

**Your choice should be driven by your specific circumstances.**

The important thing to understand is that if you find yourself outside or in a car with a tornado approaching and you are unable to get to a safe shelter, you are at risk from a number of things outside your control, such as the strength and path of the tornado and debris from your surroundings. This is the case whether you stay in your car or seek shelter in a depression or ditch, both of which are considered last resort options that provide little protection. **The safest place to be is in an underground shelter, basement or safe room.**

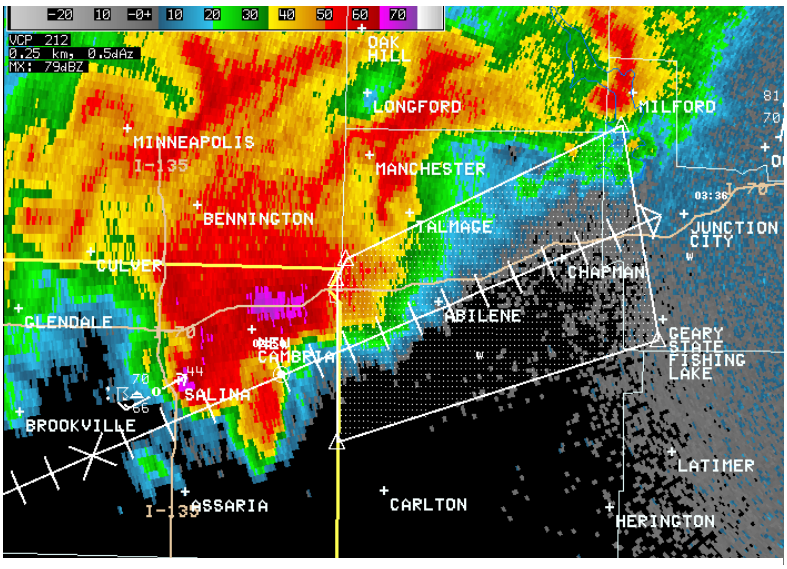
*Photos above provided by Meteorologist Scott Blair*

## Warning Operations Continued from Page 1...

country. Intricate computer models are analyzed in an attempt to predict conditions that will lead to severe weather development. This information is gathered, interpreted, and distributed to the public via the Hazardous Weather Outlook.

On the day that thunderstorms are expected to develop, real-time environmental observations become increasingly important. Surface observation systems, wind profilers, weather balloons, and satellite data are analyzed throughout the day. This information helps forecasters determine the location of frontal boundaries, time and location of thunderstorm initiation, likely thunderstorm type, and the overall potential for tornadoes, hail, or damaging winds.

Environmental data remains important as thunderstorms begin to develop. However, the most important tool to analyze the severe storms themselves is the National Weather Service Doppler Radar. The radar provides a three dimensional view of thunderstorms by obtaining data at several levels throughout the atmosphere. The radar makes a complete scan of the environment approximately every five minutes, and provides forecasters with information on thunderstorm intensity, shape, structure, and the motion of rain and hail within the storm. These data are interpreted by the forecaster for the possible presence of hail, wind, or rotation within the storm. Once it becomes apparent that a storm will produce hail one inch in diameter (the size of a quarter) or larger, or winds of 58 mph (50 knots) or greater, a severe thunderstorm warning is issued. If radar indicates strong deep rotation in a favorable area of a thunderstorm, and the surrounding environment is supportive of tornado development, then the forecaster will issue a tornado warning. Interestingly, an area of strong rotation indicated by radar is often insufficient to induce the issuance of a tornado warning. Many thunderstorms rotate, while extensive research has shown that only a small percentage possess the environmental and storm characteristics required to actually produce a tornado.




*A supercell thunderstorm is tracked (line with hash-marks) and a polygon drawn before a tornado warning is issued.*

When a warning is issued, storm spotters and public reports become increasingly important. Radar performance can vary from day to day based on atmospheric conditions, and accurate reports from near or within a storm provide invaluable information to the warning forecaster. Anyone witnessing severe weather (see right) is encouraged to relay a report to local law enforcement or the National Weather Service, with an emphasis on providing as much detail as possible.

The warning process begins well beyond the development of storms, and continues beyond the dissipation of these storms with the verification process. To review, the key components in the warning decision process are environmental data, Doppler Radar, and eye-witness reports. Each of these supplement forecasters in their duty to protect life and property.

***Report***

- Hail size (relate to coins or sports balls
- Wind speed and direction (best estimate)
- Any damage to trees or structures because of severe weather
- Funnel Clouds—is it rotating? Can you see the ground beneath the funnel?
- Tornadoes
- Where are you? Where is the severe weather occurring?
- Time the severe weather occurred

## Abilene Aviation Association "Fly-In" by Meteorologist Shawn Byrne

WFO Topeka meteorologists attended the annual Abilene Aviation Association "Fly-in" and Pancake feed held at the Abilene Municipal Airport on May 2, 2009. Forty to fifty various aircraft flew in and were on review on the flight line, and approximately three hundred pilots and members of the community were on hand to chow down a hearty pancake breakfast. Topeka meteorologists set up a

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***"NWS-Topeka meteorologists set up a booth in the dining area to provide live, real time weather information to participants"***

***Photo from the event (left, below) taken by Meteorologist Shawn Byrne***

## WAS*IS: Weather and Society*Integrated Studies

The WAS*IS program is rooted in an effort to incorporate the social sciences into meteorology. One of the key components of WAS*IS has been a summer workshop that around 200 meteorologists, hydrologists, anthropologists, economists, writers, and graduate students and other researchers in several disciplines (communication, meteorology, etc.) have attended.

The National Weather Service in Topeka was fortunate enough to send two meteorologists to the workshop this year. Scott Blair and Beth Lunde spent a week at the National Center for Atmospheric Research (NCAR) in Boulder, CO to learn ways to incorporate the social sciences into their jobs as meteorologists. Chad Omitt, the Warning Coordination Meteorologist at NWS-Topeka is also a WAS*IS alum. The goal of the workshop is to build cross-disciplinary relationships, to learn to speak the language of others, and to then discuss the societal impacts of weather, and what can be done to mitigate the issues that arise in the processes of warning decision making and response.

***Meteorologists Beth Lunde and Scott Blair take in the view from the NCAR's Mesa Lab at the base of the Flatirons in Boulder, CO***

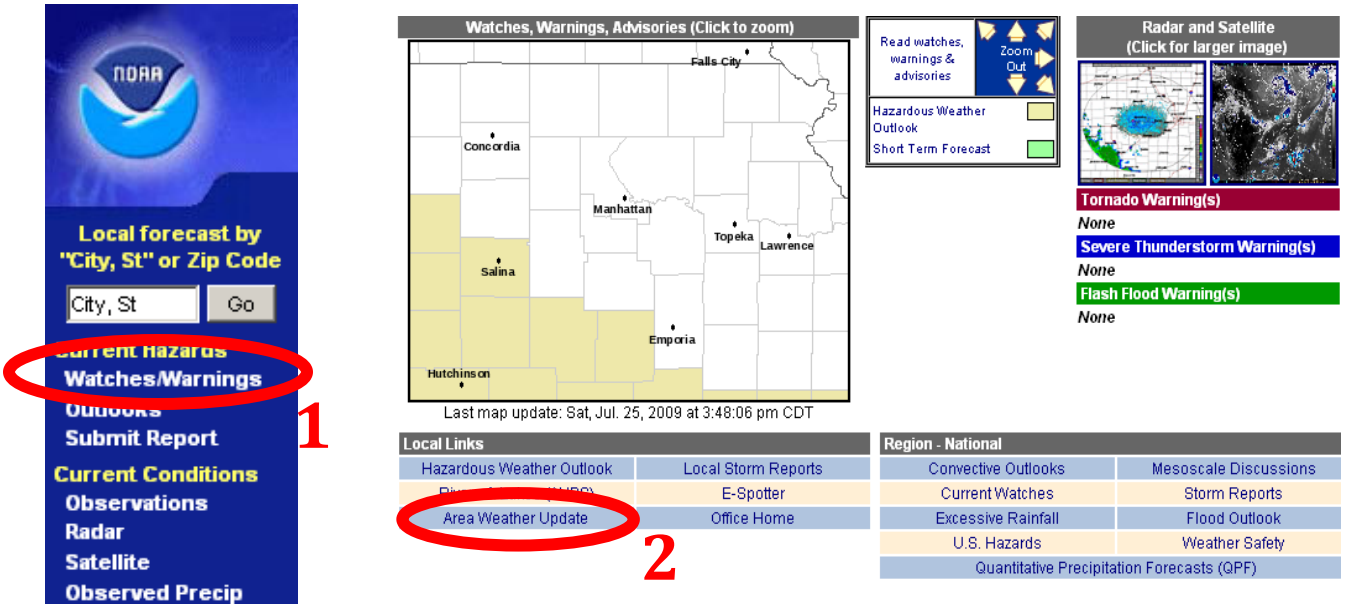
An increasing number of resources are available to those interested in the integration of the social sciences into meteorology. The Societal Impacts Program (SIP), developed within NCAR and NOAA's U.S. Weather Research Program (USWRP), serves as a common point for professionals, researchers, students, and others in meteorology and the social sciences to collaborate. Additional information can be found at http://www.sip.ucar.edu/ The National Hazards Center acts as a repository for information regarding policy and research interests with respect to the social sciences and hazards. Additional information can be found at http://www.colorado.edu/hazards/ And as mentioned above, WAS*IS helps individuals from all disciplines develop relationships to tackle the challenges within the social science realm of meteorology. Additional information can be found at http://www.sip.ucar.edu/wasis/ Much more on the societal impacts of weather will be featured in the upcoming issues of this newsletter. Stay tuned!

## New Product: The Area Weather Update (AWU)

This spring, the National Weather Service in Topeka encouraged all the meteorologists on station to issue the new "Area Weather Update" or AWU product. The product will be issued on an as-needed basis and as staffing and workload allow during convective events. The purpose of the product is to focus on short-term convective information tailored for the Topeka, KS county warning area.

The product may be issued for a number of different circumstances, including information on short-term severe and tornado warnings, imminent convective development, convective mode (i.e. supercell, squall line) and evolution, or mesoscale environmental information. The format of the product is similar to that of the area forecast discussion (AFD). The discussion will generally be short (2 paragraphs or less) and will contain technical information from meteorologists at the National Weather Service in Topeka, KS regarding one or more of the circumstances noted above. The product can be found in the severe weather section of our internet homepage. Please visit:

**www.crh.noaa.gov/hazards/top**




## Abilene "Fly-In" Continued from Page 4...

booth in the dining area to provide live, real time weather information to participants, and aviation weather information pamphlets were handed out to any and all who asked. According to Topeka meteorologist Shawn Byrne, "What we (National Weather Service) are trying to do is to create awareness for all members of the aviation community of what we do and the wealth of products available to them whether it is on the internet, in person or over the phone. We want them to understand that we are here for them."

***Photo from the event (below) taken by Meteorologist Shawn Byrne***


***The National Weather Service in Topeka would be happy to speak about the weather, preparedness, or other topics to your school or group. For more information, please call our toll free phone number at 1-800-432-3929, or email our local Warning Coordination Meteorologist Chad Omitt at chad.omitt@noaa.gov***

## Vintage Rain Gauges Replaced in Northeast Kansas by Michael Couch, HMT

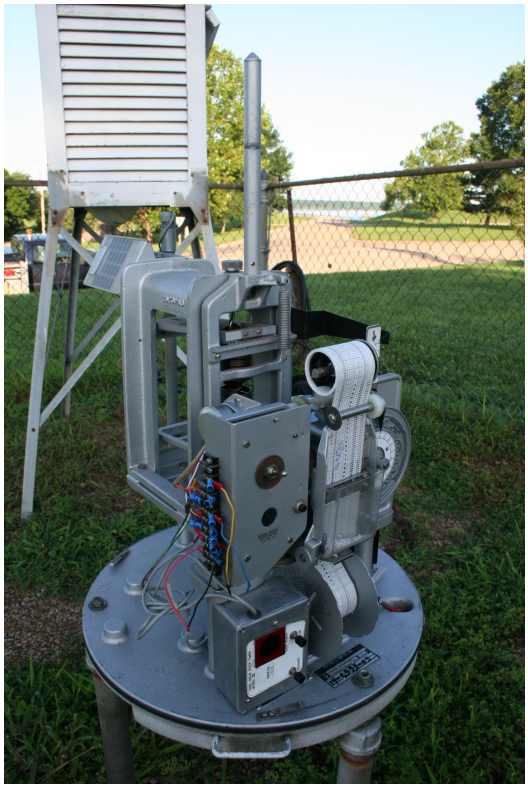


*Figure 1: An original F&P gauge.*

A long awaited replacement rain gauge was deployed at 5 US Army Corps of Engineer Sites around northeast Kansas in July. These new gauges are known as the Fischer & Porter Replacement (FPR) Gauge and they replaced the original Fischer & Porter recording rain gauges which have been in the field for nearly 50 years. The FPR gauge represents the first significant upgrade to these gauges since they were deployed in the early 1960s.

The Fischer & Porter (F&P) recording rain gauge was first introduced in the National Weather Service Cooperative program back in the early 1960s. The gauge was manufactured by the Fischer and Porter Company of Pennsylvania. The original F&P gauge converted the weight of precipitation (rain or snow) collected in a bucket on the gauge to a code disk position. This code disk position was recorded on punched paper tape at 15 minute intervals (See Figure 1). At the beginning of a given month, the Cooperative Observer at the site would tear off the last month's tape and send it to the local NWS Office. The punch tape and weighing mechanisms on these gauges was complex and hard to maintain by NWS Field Representatives. Atmospheric and environmental conditions would often wreak havoc on these machines, resulting in frequent repair trips by NWS personnel and lost data. In addition, paper tape punch readers used to transcribe and archive F&P collected data have been identified as high-risk of failure and replacement equipment is no longer available.

The NWS recognized that a replacement for these gauges was necessary and embarked on an initiative to replace the old F&P gauges in 2001. In 2005, the Fischer & Porter Upgrade (FPU) gauge was distributed to 275 of the approximately 2300 F&P sites in the United States. The FPU was the first attempt at replacing the aging F&P units and it actually worked rather well. These new gauges used the same weighing mechanism that the F&P used, however it recorded the data electronically, eliminating the punch tape mechanism. Unfortunately, the FPU had several shortcomings which included the use of a 58 pound battery and a very large equipment housing which made it necessary to install the units on a concrete pad.

Late in 2006, the NWS began looking at replacing the aging F&P units with commercially available

*Figure 2: A new Sutron data-logger.*

## Vintage Rain Gauges Continued from Page 6...

equipment. Using commercially available equipment would make the process of replacing these old units faster and more cost effective. Many companies responded with a variety of systems; however, Sutron Corporation developed an electronic data-logger which would fit entirely inside the original F&P gauge housing and was simple to install and calibrate (See Figure 2). These new units allow the observer to download the precipitation data onto a memory card similar to what is used in most digital cameras. Once downloaded, the data from these gauges is sent to the appropriate NWS Forecast Office for quality control. When the forecast office has completed a review of the data, the files are sent electronically to the National Climatic Data Center for processing into the Hourly Precipitation Data (HPD) publications (http://www.ncdc.noaa.gov/oa/mpp/ Most Requested Section F) . A total of 480 of these Sutron units will be installed by the NWS this year, leaving an additional 1800 F&P units needing replacement in later years. The NWS goal is to have all vintage F&P gauges replaced by the close of 2011.

The first FPR gauge in the state of Kansas was installed at Perry Lake on July 23rd 2009 by Bill Newman and Michael Couch of the National Weather Service Forecast Office in Topeka. A total of 4 FPR units were installed on this day; including units at Clinton, Pomona and Melvern Lakes. The final unit for northeast and north central Kansas was installed at Milford Lake on July 31st.

## Interesting Weather Facts

The air temperature around a bolt of lightning can reach up to 54,000°F—six times hotter than the surface of the sun!

Flash floods are the number one severe weather killer in the United States. Heat is the number one weather-related non-severe weather killer.

The largest hail stone documented in the US fell in Aurora, NE back in 2003. The hail stone was 7 inches in diameter, and 18.75 inches in circumference.

Tornadoes can last from several seconds to more than an hour. The longest-lived tornado in history is really unknown, because so many of the long-lived tornadoes reported from the early-mid 1900s and before are believed to be tornado series instead. Most tornadoes last less than 10 minutes.

Softball size hail fell in Manhattan, KS the first week of June, 2008. This was the largest hail documented for the area since records had been kept.

Another name for snow pellets or small hail is "graupel." This precipitation type consists of crisp, white, opaque ice particles, round or conical in shape, and about 2 to 5mm in diameter.

In the US, there are an estimated 25 million lightning flashes each year. The past 30 years, lightning has killed an average of 58 people!

National Weather Service
1116 NE Strait Avenue
Topeka, KS 66616

Phone:
1-800-432-3929

Web:
www.weather.gov/topeka

E-mail:
w-top.webmaster@noaa.gov

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## Storm Survey Information Continued from Page 1...

gency management, law enforcement, and the public to determine where damage has occurred. The meteorologists then take pictures and note GPS coordinates of the damaged areas. In the event of tornado damage, the EF-Survey kit provides guidance on assigning an EF-Scale rating based on 28 defined damage indicators. Surveys can take anywhere from an hour to several days depending on the severity of the damage. The goal of each survey is to determine the physical and monetary extent of the damage, assign an EF-Scale rating (if applicable), and collect information about the event. Several safety precautions are in place to keep surveying meteorologists safe—notably hard hats, reflective vests, and steel toed boots. Survey vehicles feature appropriate identification.

***Meteorologist Scott Blair wearing some of the Storm Survey kit gear in the field.***

**What happens with the information once it is collected?** Storm survey information is used in several ways. First, an event review will be written to the "Top News of the Day" section of the NWS-Topeka homepage (www.weather.gov/topeka). Significant events will be archived to the "Significant Events" portion of the homepage (http://www.crh.noaa.gov/top/?n=sigevents). A Public Information Statement (PNS) will also be issued by the office to distribute the data to local media, emergency managers, and other partners. Finally, this information will be included in the official Storm Data archive. Storm Data is defined as a monthly publication of the National Climatic Data Center (NCDC) that documents a chronological listing, by state, of storm and unusual weather phenomena occurrences. Reports contain information on storm paths, deaths, injuries, and property damage. Storm Data is prepared by each local forecast office, and submitted to NCDC on a monthly basis. Other websites, such as the homepage for the Storm Prediction Center (www.spc.noaa.gov), also feature storm archives.

***Some hazards at a survey site are depicted below. Nails, fallen limbs, and electrical wires all present problems.***

**What can I, as a member of the public, do to help those performing a storm survey?** First and foremost, if you notice damage at your home or business that occurred as a result of a weather phenomenon, please contact the National Weather Service in Topeka (1-800-432-3929) as soon as possible after the event to report the damage. If storm surveyors come to your home, please be as understanding as possible. We realize how difficult it may be to lose something on your property as a result of a severe weather event, but appreciate any and all information you can provide about the weather situation as it unfolded (times, sounds, how you received warning of the storm, etc). Ultimately, storm surveyors are putting together the pieces of a puzzle to get the full picture of the weather event, so please do what you can to help!