The Storm Prediction Center (SPC) at Norman, Oklahoma is a part of the National Weather Service (NWS) charged with monitoring and forecasting severe weather over the 48 continental United States. It is a division of the National Centers for Environmental Prediction (NCEP). Within SPC, the Operational Branch prepares several products that can help you prepare for hazardous and severe weather.

- What is Severe Weather?
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  - Probabilistic Outlook
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  - Severe Thunderstorm Discussion
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- Mesoscale Discussions (severe thunderstorms)
  - Heavy Rain MCD
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- 1. Severe Weather Watches
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- 4. Fire Weather Outlooks
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**What is Severe Weather?**

If you were to ask ten different people what "severe weather" means you would probably get ten different answers. The NWS definition states that a "severe" thunderstorm is any storm that produces one or more of the following elements:

- A tornado.
- Damaging winds, or winds measured 50 knots (approx. 58 MPH) or more.
- Hail three quarters (3/4) of an inch in diameter or larger.
Other forms of dangerous weather include heavy rain (flash flooding hazard), excessive heat and cold, tropical cyclones, and winter storms. Although forecasting these other types of dangerous weather is mainly the responsibility of other branches of NCEP, and of local NWS offices, the SPC also issues 1-6 hour short-term forecasts, or mesoscale discussions of certain heavy rain, heavy snow, freezing rain, and blizzard events in portions of states.

### Convective Outlooks

**Day 1 Convective Outlook**

**DAY 1 CONVECTIVE OUTLOOK...REF AWIPS GRAPHICS PGWE46 KWNS.**
VALID 311500Z - 011200Z

The Day 1 Convective Outlook, Day 2 Convective Outlook and Day 3 Convective Outlook are guidance products issued by the SPC Operational Branch in Norman, Oklahoma. The Day 1 outlook outlines areas in the continental United States where severe thunderstorms may develop during the next 6 to 73 hours. The Day 1 Convective Outlook is issued 5 times daily: at 06Z (the initial day-1 outlook, valid 12Z that day until 12Z the following day), 13Z and 1630Z (the "morning updates," valid until 12Z the next day), 20Z (the "afternoon update," valid until 12Z the next day), and the 01Z (the "evening update," valid until 12Z the following day).

**Day 2 Convective Outlook**

**DAY 2 CONVECTIVE OUTLOOK...REF AWIPS GRAPHIC PGWI47 KWNS.**
VALID 081200Z - 091200Z

The Day 2 Outlook is very similar to the Day 1 Outlook. However, it is issued only twice a day, at 08Z and 1730Z, and covers the period from 12Z the following day to 12Z the day after that. For example, if today is Monday then the Day 2 Outlook will cover the period 12Z Tuesday to 12Z Wednesday.

**Day 3 Convective Outlook**

On November 7, 2001, the SPC began issuing Convective Outlooks for the Day 3 period to the public. These outlooks are similar to the Day 2 outlooks in that the probabilities represent the probabilities of any type of severe weather hazard (tornadoes, large hail, damaging wind) within 25 miles of any point. Because of the large and increasing amount of uncertainty forecasting severe weather 3 days ahead of time no attempt is made to forecast areas of significant severe weather hazards.

**Plotting the Points**

**THERE IS A SLGT RISK OF SVR TSTMS TO THE RIGHT OF A LINE FROM 45 ESE YUM TRM NID P38 CDC BCE U28 EVW LND 4DG LBF OLU MKT 55 NW CMX ...CONT...40 E TOL FDY LUK 513 PSK 25 NE ECG.**
Standard aviation identifier location codes are used to delineate the risk areas on the Day 1 and Day 2 outlook. [A list of many of these identifiers can be found online by clicking here]. When plotted with a line drawn between each point, the outlined area forms a polygon. The points may either fall exactly on top of the location identifiers (i.e. DAL...SPS...GAG) or may be referenced from those points (i.e. 20 NW FMY...10 E MIA) in which case the point would be xx number of nautical miles in the given direction from that point. The previous example would read 20 nautical miles northwest of Ft. Myers FL to 10 nautical miles east of Miami. The designator "...CONT..." is used to indicate that the risk area goes to the U.S. border, then starts again at another location on the border. For example, part of a risk area might say "MSP INL ...CONT... SSM". This means the risk area goes from Minneapolis to International Falls then runs along the Canadian border to Sault Ste. Marie. A single product may describe several separate risk areas. For example, there might be one risk area for the Central Plains and another one for southern Florida.

Levels of Risk

Risk areas come in five varieties and are based on the expected number and intensity of severe thunderstorm reports over an area:

- GEN TSTMS (not labelled on the graphic outlook but listed in the discussion) - General (non-severe) thunderstorms
- SEE TEXT - A label on the graphic only
- SLGT - Slight risk, both graphic and text
- MDT - Moderate risk, both graphic and text
- HIGH - High risk, both graphic and text

The SEE TEXT label appears only on the graphic map. Although there is no severe outlook for the labeled area, you should read the text of the outlook discussion to be aware of the potential for a threat to develop, if some environmental conditions come together. As a rule, the "SEE TEXT" is used on the Day 2 and Day 3 Outlooks for areas where severe weather is possible, but there is too much forecast uncertainty (questionable model data, capping, moisture return, or other such factors) to issue a risk area. The "SEE TEXT" will be used in the Day 1 Outlooks to discuss areas where a few severe storms are possible or storms may approach severe levels, but the coverage or intensity is expected to be too small or marginal for a risk area. Again, note that SPC severe thunderstorms outlooks are not meant to cover every single possibility of a severe thunderstorm -- otherwise, severe and general thunder outlooks would be the same.

\[ \leq 2\% \text{ areal coverage} \rightarrow 5\% \text{ prob. within 25 mi} \]

A SLGT risk implies well-organized severe thunderstorms are expected but in small numbers and/or low coverage. Within a slight risk area, 5-29 reports of 1 inch of larger hail, and/or 3-5 tornadoes, and/or 5-29 wind events are forecast.

\[ \sim 2\% - 5\% \text{ areal coverage} \rightarrow 15\% - 25\% \text{ prob. within 25 mi} \]

MDT risks imply a greater concentration of severe thunderstorms, and in most situations, greater magnitude of severe weather. Within a moderate risk area, at least 30 reports of hail 1 inch or larger, or 6-19 tornadoes, or numerous wind events (30 that might be associated with a squall line, bow echo or derecho) are forecast.

\[ \sim 6\% - 10\% \text{ areal coverage} \rightarrow 35\% - 45\% \text{ prob. within 25 mi} \]

The HIGH risk area almost always means a major severe weather outbreak is expected, with great coverage of severe weather and enhanced likelihood of extreme severe (i.e., violent tornadoes or extreme convective wind events over a large area). Within a high risk area, expect at least 20 tornadoes with at least 2 of them rated F3+, or an extreme derecho causing 50+ widespread wind events (50+) with

\[ \geq 10\% \text{ areal coverage} \rightarrow > 45\% \text{ prob. within 25 mi} \]
numerous higher end wind (80+ mph) and structural damage reports.

The report criteria for each of those risks is valid for an area the size of Oklahoma without the panhandle, or about 50,000 square miles. As the size of the risk area increases (decreases) from 50,000 square miles, those expected severe weather numbers would increase (decrease) proportionally.

In addition to the severe risk areas, general thunderstorms (non-severe) are outlined, but with no label on the graphic map. Within this area, a 10% or greater probability of thunderstorm occurrence is forecast.

Severe Thunderstorm Discussion

...SEVERE THUNDERSTORM FORECAST DISCUSSION...

--- SYNOPSIS ---
UPPER FLOW IS LOSING AMPLITUDE OVER U.S. AS STRONGER WLYS SHIFT NWD INTO SRN CANADA. FORMER HURRICANE JIM...NOW A MARGINAL TROPICAL STORM...IS WEAKENING AS IT MOVES NNEWD ACROSS FL KEYS/STRAITS. COLD FRONT CONTS TO PUSH E AND S ACROSS N-CENTRAL U.S. WITH MOIST/UNSTABLE AIR MASS AVAILABLE IN WARM SECTOR. SIGNIFICANT FRONTOLYSIS IS EXPECTED TO BE UNDERWAY OVER OH VALLEY BY END OF PERIOD.

--- WRN GREAT LAKES TO CNTRL PLAINS ---
VERY MOIST AND POTENTIALLY UNSTABLE LOW LEVEL AIR MASS CONTINUES AHEAD OF COLD FRONT NOW LOCATED FROM CENTRAL UPPER MI SSWD INTO SRN NEB. AS AMBIENT FLOW WEAKENS GRADUALLY THROUGH PERIOD...VERTICAL SHEAR PROFILES OVER MOST OF THE REGION WILL ONLY MARGINALLY SUPPORT A SEVERE THREAT...HOWEVER CONVECTIVE INSTABILITY WILL REMAIN FAVORABLE. FORECAST MLCAPE IN 2500-3500 J/KG RANGE WILL BE COMMON BY MID/LATE AFTERNOON PERIOD OF PEAK DIABATIC HEATING...WHILE SURFACE DEW POINTS WILL STAY IN 70-75 DEG F RANGE. THERE SHOULD BE SUFFICIENT CONVERGENCE ALONG OR JUST AHEAD OF SURFACE FRONT TO INITIATE SEVERE MULTICELL STORMS...WHICH WILL BE OUTFLOW-DOMINANT GIVEN WEAK STORM-RELATIVE INFLOW AND LARGE DEW POINT DEPRESSIONS. DAMAGING DOWNDRAFTS WILL BE THE MAIN THREAT...AND A FEW LARGE HAIL EVENTS ARE POSSIBLE AS WELL. SEVERE THREAT SHOULD DIMINISH SHORTLY AFTER DUSK -- WITH LITTLE ADDITIONAL DEVELOPMENT EXPECTED ALONG RESIDUAL OUTFLOW BOUNDARIES. MODIFIED FORECAST SOUNDINGS INDICATE CAPE WILL DISAPPEAR WITH A FEW DEGREES OF NOCTURNAL DIABATIC COOLING IN BOUNDARY LAYER.

Each risk area has its own detailed discussion describing the factors expected to produce severe weather and the type and timing of severe weather expected.

General Thunderstorm Discussion

...GENERAL THUNDERSTORM FORECAST DISCUSSION...

--- FL ---
THUNDER IS EXPECTED TO CONTINUE ACROSS MUCH OF FL PENINSULA DURING PERIOD AS REMNANTS OF T.S. JIM MOVE SLOWLY NNEWD ACROSS REGION. REFER TO NHC TROPICAL CYCLONE BULLETINS FOR LATEST TRACK/INTENSITY GUIDANCE. LOW LEVEL THEETA AND CONVERGENCE WILL REMAIN STRONG...BUT SHEAR PROFILE WILL BE WEAKENING IN THE SMALL PORTION OF NE QUADRANT THAT IS FORECAST TO AFFECT THE SE COAST. THIS INDICATES MAINLY A HEAVY RAIN THREAT...WITH

http://www.spc.noaa.gov/misc/about.html
STRONGEST THUNDERSTORMS LIKELY IN OUTER SPIRAL BANDS. REFER TO NCEP QPF DISCUSSION FOR MORE DETAILS ON HEAVY RAIN GUIDANCE.

..EDWARDS.. 10/18/99

A separate discussion is sometimes provided describing non-severe thunderstorms are possible and the factors expected to initiate them. This part will often be more generalized than the severe thunderstorm discussion. General thunderstorm discussions are not included in many cases when severe thunderstorm risks are in the outlook, due to time constraints and the greater priority placed the on severe weather portion.

Using the Technical Outlooks

SPC outlooks are issued daily, in UTC or "Z" time (subtract 6 hours for CST, 5 for CDT):

- The Day 1 Outlooks will be issued at 0600Z, 1300Z, 1630Z, 2000Z and 0100Z year-round.
- The Day 2 Outlooks will be issued at 0830Z and 1730Z during standard time, and 0730Z and 1730Z during daylight time.

SPC outlooks are designed for more sophisticated weather customers -- although they are widely available on the Internet -- and are considered "guidance" products. The discussions are technical and useful in judging one's chances of being included in a watch later in the day. Spotters can be notified that "today is a day to keep in touch" when there is a risk over your local area. This tends to increase spotter turnout when a watch is issued. Like all guidance products, the outlooks are not a guarantee for severe weather. The Outlook must be used in conjunction with other products to get the full picture. It is a forecast product and is subject to change as additional data is evaluated. For example, what appeared to be a MDT risk situation at 06Z may be downgraded to a SLGT risk at 1630Z as the 12Z upper air soundings might show the atmosphere had stabilized more than previously forecast. The opposite can happen also.

It is important not to rigidly associate the type of risk area (SLGT, MDT, HIGH) with the severe potential for any given thunderstorm in the risk area. That is, just because a SLGT risk is forecast does not necessarily mean that the thunderstorms within the risk area will be slightly severe. Sometimes, violent tornadoes occur in SLGT or MDT risk areas as opposed to HIGH. The reason for this is the synoptic situation producing the violent tornadoes may be confined to a relatively small area. Another SLGT risk area may cover several states in which only one or two tornadoes may develop. Some SLGT situations don't involve a threat of tornadoes or supercells at all, but only large hail and/or downbursts. Some HIGH risk situations are expected to result in a large number of severe reports, but not necessarily tornadic or extreme in magnitude.

Remember that almost any thunderstorm can, at some point in its lifetime, produce severe or nearly severe weather. Any thunderstorm can kill. SPC severe weather outlooks, though, are keyed to the well-organized severe weather events most capable of damage and injury from either tornados, damaging winds or large hail. They are not meant to cover every isolated, brief or marginally severe thunderstorm; otherwise the general thunder and SLGT risk lines would nearly always be the same.

Pulse-type thunderstorms, consisting primarily of solitary brief severe updrafts (often found in environments with weak vertical windshear) are not considered to be organized. Convection of this type,
and isolated severe storms with marginal intensities or short durations, will likely not be included in a risk area. When an unusually dense or large area of marginally severe reports is anticipated, though, the area of concern will probably be included in a SLGT risk. Examples of "organized" convection include supercells, squall lines, and multicell thunderstorm complexes.

General thunderstorm outlooks are guidance for local forecasters concerning the possibility of more than very isolated or brief thunderstorms in or near their areas. General thunderstorm outlooks forecast thunderstorm coverage of 10% or more of the broad region drawn. For that reason, occasionally very isolated, brief or sparse thunderstorms "outside the lines." Also, the lack of a severe risk within a general thunder outlook does not imply there will be zero severe thunderstorms. Again, almost any thunderstorm may produce a severe weather event. It doesn't necessarily mean there is a conflict or bad forecast when a severe thunderstorm warning is issued by a local NWS office in an SPC general thunderstorm outlook.

In short, no two situations are alike, even within the same risk category. This is why a narrative discussion accompanies the outlook - to specifically describe and provide rationale for what kind of severe weather is expected and where/when it is most likely within a risk area.

**Public Severe Weather Outlooks**

The Public Severe Weather Outlooks (PWO) are issued when a potentially significant or widespread tornado outbreak is expected. This plain-language forecast is typically issued 12-24 hours prior to the event and is used to alert NWS field offices and other weather customers concerned with public safety of a rare, dangerous situation. The PWO is reserved for only the most serious weather situations where a HIGH risk is forecast for a potential tornado outbreak. The SPC issues around 5 PWO's each year. Here is an example of a PWO:

```
ZCZC MKCPWOMKC ALL
WOUS36 KMKC 211703
ARZ000-LAZ000-TNZ000-MSZ000-220000-
PUBLIC SEVERE WEATHER OUTLOOK
STORM PREDICTION CENTER NORMAN OK
1100 AM CST THU 21 JAN 1999

...OUTBREAK OF SEVERE THUNDERSTORMS INCLUDING A FEW INTENSE TORNADOES ARE EXPECTED OVER PARTS OF THE LOWER MISSISSIPPI VALLEY THIS AFTERNOON THROUGH TONIGHT...

THE STORM PREDICTION CENTER IN NORMAN OK IS FORECASTING THE DEVELOPMENT OF A FEW INTENSE TORNADOES OVER PARTS OF THE LOWER MISSISSIPPI VALLEY AND SOUTH CENTRAL STATES LATER TODAY THROUGH TONIGHT.

THE AREAS MOST LIKELY TO EXPERIENCE THIS ACTIVITY INCLUDE:
MUCH OF ARKANSAS
NORTHERN LOUISIANA
SOUTHWESTERN TENNESSEE
NORTHERN MISSISSIPPI

STRONG LOW LEVEL SOUTHERLY WINDS HAVE PUSHED WARM MOIST AIR FROM THE GULF OF MEXICO NORTHWARD ACROSS THE LOWER MISSISSIPPI VALLEY REGION THIS MORNING. TO THE NORTHWEST...MUCH COLDER AIR FROM CANADA
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http://www.spc.noaa.gov/misc/about.html 2/17/2006
IS BEGINNING TO MOVE SOUTHEASTWARD BEHIND A STRONG COLD FRONT. LATE THIS AFTERNOON AND TONIGHT...THUNDERSTORMS WILL RAPIDLY INTENSIFY ALONG OR JUST AHEAD OF THE COLD FRONT OVER WESTERN ARKANSAS AND WESTERN LOUISIANA WITH ACTIVITY MOVING EASTWARD TOWARD THE LOWER MISSISSIPPI RIVER VALLEY OVERNIGHT. WINDS IN THE UPPER PORTIONS OF THE ATMOSPHERE WILL HAVE SPEEDS NEAR 100 MILES AN HOUR CREATING FAVORABLE CONDITIONS FOR A FEW VERY DESTRUCTIVE TORNADOES. IN ADDITION...COLD DRY AIR ALOFT WILL RESULT IN WIDESPREAD AREAS OF LARGE HAIL AND DAMAGING WINDS.

THIS IS POTENTIALLY A VERY DANGEROUS SITUATION. THOSE IN THE THREATENED AREA ARE URGED TO REVIEW SEVERE WEATHER SAFETY RULES, AND TO LISTEN TO RADIO AND TELEVISION AND NOAA WEATHER RADIO FOR POSSIBLE WATCHES, WARNINGS AND STATEMENTS LATER TODAY.

JOSEPH ROGASH
LEAD FORECASTER
STORM PREDICTION CENTER

Mesoscale Discussions

When conditions appear favorable for severe storms development, SPC issues a Mesoscale Discussion (MCD), normally 1 to 3 hours before issuing a weather watch. SPC also puts out MCDs for mesoscale aspects of hazardous winter weather events including heavy snow, blizzards and freezing rain (see below). MCDs are also issued on occasion for heavy rainfall or convective trends.

The MCD basically describes what is currently happening, what is expected in the next few hours, the meteorological reasoning for the forecast, and when/where SPC plans to issue the watch (if dealing with severe thunderstorm potential). Severe thunderstorm MCDs provide extra lead time on the severe weather development and allow you to begin gearing up operations before a watch is issued.

ZCZC SPCSWOMCD ALL
ACUS11 KWNS 152317
^^SPC MCD 152317
SC2000-NCZ000-160215-

MESOSCALE DISCUSSION 2065
NWS STORM PREDICTION CENTER NORMAN OK
0617 PM CDT TUE OCT 15 2002

AREAS AFFECTED...PAMLICO SOUND/OUTER BANKS OF NORTH CAROLINA/ CAROLINA COASTAL WATERS

CONCERNING...SEVERE THUNDERSTORM POTENTIAL

VALID 152317Z - 160215Z

WATERSPOUTS/STRONG WIND GUSTS WILL REMAIN POSSIBLE THROUGH 0200Z IN THE COASTAL WATERS OF SOUTH CAROLINA AND NORTH CAROLINA AS SURFACE LOW NOW ABOUT 80 ESE ILM TRACKS NORTHWARD TOWARD THE PAMLICO SOUND AREA THIS EVENING. SOME INCREASE IN THREAT OF TORNADOES WILL RESULT...ESPECIALLY LATER THIS EVENING.

INITIAL MCS BRUSHING THE OUTER BANDS IS JUST NORTHEAST OF MAIN
SURFACE LOW. ENTIRE MCS SHOWS BROAD ROTATION IN RADAR IMAGERY...AND NUMEROUS EMBEDDED ROTATING STORMS ARE EVIDENT ABOUT 15-50 MILES OFFSHORE. DUE TO LARGE SHIELD OF MODERATE/HEAVY RAIN ON NORTHERN EDGE OF MCS OVER EASTERN NORTH CAROLINA... DESTABILIZATION PROCESS OVER LAND WILL BE SLOW DURING THE EVENING. STILL...A COUPLE OF THE ROTATING CELLS WITH AN OUTSIDE CHANCE OF A TORNADO WILL BRUSH NEAR THE OUTER BANKS IN THE NEXT FEW HOURS.

NORTH-SOUTH BAND OF THUNDERSTORMS THAT HAS MOVED OFFSHORE OF THE FLORIDA ATLANTIC COAST LIKELY MARKS THE LEADING EDGE OF THE REGION OF UPWARD MOTION THAT WILL CAUSE SIGNIFICANT DEEPENING OF THE SURFACE LOW AS IT SPREADS TOWARD THE NORTH CAROLINA COASTAL WATERS LATER TONIGHT. CELL 75 S CHS HAS SHOWN SOME SUPERCASEL CHARACTERISTICS AS IT TRACKS ALONG SURFACE FRONT. EXPECT INCREASING THREAT OF WATERSPOUTS ABOUT 50 MILES OFFSHORE WITH THIS CONVECTION IN THE NEXT FEW HOURS AS WELL.

..CRAVEN.. 10/15/2002

...PLEASE SEE WWW.SPC.NOAA.GOV FOR GRAPHIC PRODUCT...

31848001 32757916 33707776 34627680 35427636 35987545
35197453 34077533 32887698 31667909

NNNN

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Heavy Rain MCD

SPC heavy rain MCDs are typically issued for:

- 1) Rainfall rates up to 3 inches per hour are expected with slow moving convection (e.g., storms moving at 10 knots or less),
- 2) rainfall amounts of at least 2 inches expected at any one location within one hour,
- 3) rainfall rates of at least 1 ? inches/hour are expected to last at least 3 hours with a total rainfall of at least 4.5 inches, or
- 4) the forecast of an end to a heavy rain event.

Heavy Rain MCDs will contain the expected location, rainfall rates, durations and, most importantly, the reasoning for the forecast heavy rain episode. They're written for somewhat narrower space and time frames than severe weather MCDs: 0-3 hours, and specific sets of counties where the greatest rains are expected. The heavy rain MD is intended as forecast guidance to local NWS offices about the most significant heavy rainfall area; and is not intended to focus on large areas of heavy rain or to be a QPF product.

If heavy rains have already occurred, a heavy rain MCD usually will not be written, unless:

- 1) Changing meteorological parameters that indicate an end to heavy rains,
- 2) A heavy rain episode threatens within an area of severe thunderstorms,
- 3) Additional storms with heavy rains are expected across the same area where recent heavy rains have occurred, or
- 4) Heavy rains are expected to continue while moving into a different area.

http://www.spc.noaa.gov/misc/about.html
**Winter Weather MCD**

Winter weather MCD's focus on the meteorological processes expected to cause hazardous winter weather: the where, when, what, and (most importantly) why. The meaning of "hazardous weather" varies; but discussions on heavy snow are issued for lake effect snowstorms, climatologically anomalous events or unexpected events. Winter weather MCDs are also issued for forecast snowfall rates of at least 1" per hour in the lowlands and plains, and 2" per hour for areas higher than 4000 feet. Winter MCDs are also issued for freezing rain events especially when amounts are expected to greater than 0.05" per three hours, or for blizzard conditions lasting over three hours.

If hazardous winter weather has already occurred, a MCD usually will not be written, except for:

- 1) Changing meteorological parameters that indicate an end to the event
- 2) An episode that may have been overlooked,
- 3) Further hazardous winter weather across the same area where recent heavy snow, freezing rain or blizzard conditions have occurred, or
- 4) When an event is expected to continue and shift into a different area.

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**Severe Weather Watches**

When conditions become favorable for severe thunderstorms and tornadoes to develop, SPC usually issues a severe thunderstorm or tornado watch. Tornadoes can occur in either type of watch but tornado watches are issued when conditions are especially favorable for tornadoes. Watches encourage the general public to stay alert for changing weather conditions and possible warnings. For emergency managers, storm spotters, and the broadcast media, watches provide valuable lead time to gear up operations and increase staffing. Watch "boxes" are designated by a set of coordinates which form a parallelogram. A typical watch might include as many as 20,000 to 40,000 square miles. They are numbered sequentially (the count is reset at the beginning of each year). A typical watch has a duration of about four to six hours but it may be canceled, replaced, or re-issued as required. *A watch is not a warning, and should not be interpreted as a guarantee that there will be severe weather!*

When a severe weather watch is issued close to your location but does not include your location, you should still remain alert. The atmosphere rarely follows straight lines, and thunderstorms do not always remain within the man-made boundaries we create around them. When SPC feels confident about the possibility of severe weather in a specific area, they try to issue a watch at least 1 hour prior the onset of severe weather.

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ZCZC MKCSEL7
:455,0963 433,0961 433,0990 455,0993:WWUS9 KMKC 011729
MKC WW 011729
SDZ000-020000-

BULLETIN - IMMEDIATE BROADCAST REQUESTED
TORNADO WATCH NUMBER 547
STORM PREDICTION CENTER NORMAN OK
1229 PM CDT TUE JUL 1 1997

THE STORM PREDICTION CENTER HAS ISSUED A
TORNADO WATCH FOR PORTIONS OF

EASTERN SOUTH DAKOTA

EFFECTIVE THIS TUESDAY AFTERNOON AND EVENING FROM 100 PM UNTIL 700 PM CDT.

TORNADOES...HAIL TO 2 INCHES IN DIAMETER...THUNDERSTORM WIND GUSTS TO 75 MPH...AND DANGEROUS LIGHTNING ARE POSSIBLE IN THESE AREAS.

THE TORNADO WATCH AREA IS ALONG AND 70 STATUTE MILES EAST AND WEST OF A LINE FROM 40 MILES NORTH NORTHEAST OF ABERDEEN SOUTH DAKOTA TO 25 MILES SOUTHEAST OF MITCHELL SOUTH DAKOTA.

REMEMBER...A TORNADO WATCH MEANS CONDITIONS ARE FAVORABLE FOR TORNADOES AND SEVERE THUNDERSTORMS IN AND CLOSE TO THE WATCH AREA. PERSONS IN THESE AREAS SHOULD BE ON THE LOOKOUT FOR THREATENING WEATHER CONDITIONS AND LISTEN FOR LATER STATEMENTS AND POSSIBLE WARNINGS.

OTHER WATCH INFORMATION...THIS TORNADO WATCH REPLACES TORNADO WATCH NUMBER 546. WATCH NUMBER 546 WILL NOT BE IN EFFECT AFTER 100 PM CDT.

DISCUSSION...LINE OF THUNDERSTORMS HAS SHOWN SIGNS OF ORGANIZING OVER CENTRAL SOUTH DAKOTA IN ADVANCE OF VIGOROUS UPPER TROUGH MOVING TOWARD THE HIGH PLAINS. SATELLITE IMAGERY SHOWS A FEW BREAKS IN CLOUD COVER OVER EASTERN SOUTH DAKOTA SUGGESTING LOCAL AREAS OF ENHANCED HEATING/DESTABILIZATION WILL OCCUR. STORMS WILL ENCOUNTER INCREASINGLY UNSTABLE AIR MASS AS THEY SPREAD ACROSS EASTERN SOUTH DAKOTA...WITH POTENTIAL FOR SEVERE THUNDERSTORMS AND ISOLATED TORNADOES BECOMING MORE FAVORABLE BY MID AFTERNOON.

AVIATION...TORNADOES AND A FEW SEVERE THUNDERSTORMS WITH HAIL SURFACE AND ALOFT TO 2 INCHES. EXTREME TURBULENCE AND SURFACE WIND GUSTS TO 65 KNOTS. A FEW CUMULONIMBI WITH MAXIMUM TOPS TO 500. MEAN STORM MOTION VECTOR 23030.

...WEISS

;455,0963 433,0960 433,0990 455,0993;

Watch Parts

Corner points:

Watches are numbered sequentially; and he numbers start over again at the beginning of each year. In the header, the last digit of the number of this watch is 7 (MKCSEL7), and the whole watch number is given several lines later.

The watch describes in plain language the state(s) affected, valid times, severe weather potential, meaning of the watch, replacements (if any), a short weather discussion, and aviation info for pilots.
In the AVIATION section, the storm top numbers are in hundreds of feet; so "500" is 50,000 feet. MEAN STORM MOTION VECTOR is the average expected motion of all the storms in the watch: The first 3 digits are direction the storms will move from on a 360-degree compass; and the last two digits are the storm's expected forward (ground) speed in knots. So in this watch, storms are forecast to move from the southwest (from 230 degrees) at 30 knots.

When weather conditions are favorable for a major outbreak of severe thunderstorms or tornadoes, the SPC will often highlight watches with the following "enhanced" wording:

"THIS IS A PARTICULARLY DANGEROUS SITUATION WITH THE POSSIBILITY OF VERY DAMAGING TORNADOES. ALSO...LARGE HAIL...DANGEROUS LIGHTNING AND DAMAGING THUNDERSTORM WINDS CAN BE EXPECTED"

Similar wording not mentioning tornadoes may be used for extremely destructive thunderstorm-wind events as well.

Not all weather situations are so clear cut though. For example, severe weather may be expected IF thunderstorms form, but there is doubt about whether storms will form to begin with. In such cases, SPC may wait until storms actually develop before they issue a watch. Although uncommon, a warning can sometimes precede a watch. At times, SPC may be quite confident that severe weather will occur (in fact it may already be occurring) but because they believe the storms will be confined to such a small area or will soon diminish, they may elect not to issue a watch at all. Instead, any severe weather that occurs will be best handled with warnings issued by your local NWS office.

Areal Outlines

When a watch is issued, SPC transmits a statement to local NWS forecast offices redefining the watch coordinates in terms of the counties it affects. The local forecast office can add or delete counties from this list to suit the specific weather situation. If a watch is issued close to your area but does not include your specific county, you should still pay close attention to the weather situation.

Expiration

Watches that expire on schedule just go away. This is usually mentioned in the last status report before the watch expiration time. Your local NWS office should issue a special weather statement explaining that a watch has expired and the threat for severe storms has diminished.

Cancellations

SPC may cancel a watch when the severe weather they expected has failed to develop or severe storms moves out of the area. Other times SPC may cancel a watch, even though severe thunderstorms are still occurring, when they believe the storms will either die or remain non-severe.
Replacement Watches

Some watches will be replaced by completely new ones. This happens when the activity moves out of the old watch area into the new watch, when the orientation or size of the original watch no longer adequately describes the present threat, or when a sufficiently great threat of severe storms continue to persist beyond the expiration time of the original watch. Replacement watches may overlay all or portions of a previous watch area. The old watch is considered canceled at the time the new watch goes into effect. In some cases, watches overlap; then, the latest watch for the overlapped area is the valid one.

Watch Status Messages

Watch Status Messages will be issued at the top of each hour, during the lifetime of each severe thunderstorm and/or tornado watch. The watch will be in effect at least 30 minutes before the first watch status message is written. The watch status message will not include a discussion of the meteorology affecting the watch area. If there is an ongoing MCD that discusses the meteorology within a watch, the watch status message will refer the user to the appropriate convective MCD issuance. The exception will be in the final watch status message, issued one hour prior to the watch expiration. This watch status message will include one or two sentences explaining why the watch will be re-issued or allowed to expire.

Your local NWS office may issue special weather statements about partial cancellations and/or issue amended forecasts removing all mention of the watch. The following is an example of a status report.

ZCZC MKCWAMKC
:433,0983 465,0951 465,0914 433,0950:WWUS8 MKKC 310700
MKC WW-A 310700

STATUS REPORT ON WW NUMBER 885

THE THREAT OF SEVERE WEATHER CONTINUES TO THE SE OF A LN FM 30 N BRD TO 5 E AXN TO 70 N BKX.

INSTABILITY WILL CONTINUE TO DECREASE WITH THE SEVERE THREAT CONTINUING TO DECREASE WW 885 WILL EXPIRE AS SCHEDULED AT 0800Z.

..VESCIO.. 07/31/95

Fire Weather Outlooks

The purpose of the SPC Fire Weather Outlooks and meteorological Risk Categories is to indicate areas where the combination of dry dead fuels, such as grass and timber, and meteorological conditions (wind, relative humidity, temperature, and dry thunderstorms) might contribute to potentially dangerous wild fire behavior.

The SPC does not forecast local meteorological conditions (i.e. local variability of relative humidity or the effects of terrain on wind direction and speed). In addition, slope of local terrain, types of fuels (fuel model), variability of fuels, and live fuel moisture content are not considered in detail.
Statistics from the Storm Prediction Center

The SPC rough log is compiled by an automatic PC logging program running at the Storm Prediction Center at Norman, OK, and is issued daily. On the Web, you can find it here. It is also available via the WX-STORM served by LISTSERV.UIUC.EDU. The log is a raw listing of all continental U.S. severe weather reports that SPC received during the 24 hour period from 6:00 AM CST the previous day up until 6:00 AM CST on the day of issuance. This is only a preliminary list. Because the logging process is automated, improperly formatted reports from NWS field offices may not get into the data base. Also, reports could arrive after the daily log is compiled, and be missed in the list. All occurrence times are referenced to Central Standard Time -- even if the event occurred in a different time zone or during Daylight Savings Time.

Reports are lumped under three basic categories: tornado reports, large hail/strong wind reports, and other severe reports. The "tornado reports" section is self explanatory. The "large hail/strong winds reports" section contains information on very large hail and major wind damage. The "other severe reports" section contains miscellaneous reports of marginally severe weather such as hail one inch in diameter or smaller.

The log is a raw listing of all reports received. The final list of reports is found in the monthly publication Storm Data, which is compiled by the National Climatic Data Center (NCDC) several months later from report lists submitted by local NWS offices. For details about Storm Data, contact the National Climatic Data Center thru orders@ncdc.noaa.gov.

Again, there is no guarantee as to the accuracy of SPC rough log reports and should be regarded as strictly preliminary. Again, the rough log is automated and depends on properly formatted local storm reports (LSRs) sent by local NWS offices. Reports may be reclassified as time goes on, too. What's initially reported as a tornado today might be called straight-line wind damage a few days later after a survey. While SPC maintains a detailed database in Norman, they do not issue corrections to the daily report log. Further, if the report doesn't make it into the log during the 24 hour log period in which the event occurred, the event will not be listed. That is, wind damage discovered today from a storm that happened two days ago will not be listed in today's report log.

Here's what a typical report log report might look like:

ZCZC MKCSTADTS
WWUS60 KMKC 131200
SPC TORNADO AND SEVERE THUNDERSTORM REPORTS
UNOFFICIAL - FOR OFFICIAL REPORTS, SEE PUBLICATION 'STORM DATA'
FOR 06CST TUE OCT 12  1993 THRU 06CST WED OCT 13  1993

EVENT LOCATION REMARKS (CST)TIME

TORNADO REPORTS...........TORNADO REPORTS...........TORNADO REPORTS.....

80 *TORN 2 SW DUSTER TX (28 WSW SEP) 12/2145
PSBL TORNADO; HOMES DMGD; SVRL PERSONS FTW/LSR 32139865
HOSPITALIZED

.......LRG HAIL/STRONG WIND RPTS.......LRG HAIL/STRONG WIND RPTS.....

55 A450 PROFFITT TX (55 WNW MWL) 12/1905
FTW/LSR 33199888

http://www.spc.noaa.gov/misc/about.html
2/17/2006
How to Read an SPC Report Log

- Event Number: 80 (the 80th severe event received during this 24 hour period).
  - Event: "*TORN" Tornado.
  - Location: Occurred 2 SW Duster, TX. Referenced to the closest airport, the tornado occurred 28 miles west-southwest of Stephenville, TX.
  - Date/Time: 12/2145 Occurred on the 12th day of the month at 2145 CST.
  - Details: They are calling this a possible tornado. Further investigation may or may not support this. The event resulted in the hospitalization of several people.
  - Source: FTW/LSR. SPC learned about this from a Local Storm Report (LSR) issued by the National Weather Service at Ft. Worth, TX (FTW).
  - Coordinates: The report location was at 32.13 degrees north, 92.65 degrees west.

- Event Number: 55 (the 55th severe event received during this 24 hour period).
  - Event: "A450" Hail 4.50 inches in diameter.
  - Location: Occurred in Proffitt, TX. Referenced to the closest airport, the hail occurred 55 miles west-northwest of Mineral Wells, TX.
  - Date/Time: 12/1905 Occurred on the 12th day of the month at 1905 CST.
  - Details: No details.
  - Source: FTW/LSR. SPC learned about this from a Local Storm Report (LSR) issued by the National Weather Service at Ft. Worth, TX (FTW).
  - Coordinates: The hail was reported at 33.19 degrees north, 98.88 degrees west.

Here are some of the more common report abbreviations:

- *TORN Tornado (always has asterisk to catch your eye).
- A nnn Hailstones and diameter in inches. 475 would be 4.75 inches.
- WNDG Wind damage (usually has description of damage).
- G nnn Wind gust and speed in knots.
- B 0 Pilot report (report of event occurring while aircraft is aloft).

Hourly Severe Weather Report Log

http://www.spc.noaa.gov/misc/about.html
This is an hourly updated version of the daily report log. It is in the same format, except for some coding in the header:

ZCZC MKCSTAHRY
WWUS60 KMKC 131200

SPC TORNADO AND SEVERE THUNDERSTORM REPORTS
UNOFFICIAL - FOR OFFICIAL REPORTS, SEE PUBLICATION 'STORM DATA'
FOR 06CST TUE OCT 12 1993 THRU 22CST WED OCT 13 1993

EVENT LOCATION REMARKS (CST)TIME

TORNADO REPORTS........TORNADO REPORTS........TORNADO REPORTS.....
80 *TORN 2 SW DUSTER TX (28 WSW SEP) 12/2145
PSBL TORNADO; HOMES DMGD; SVRL PERSONS FTW/LSR 32139065
HOSPITALIZED

.......LRG HAIL/STRONG WIND RPTS.......LRG HAIL/STRONG WIND RPTS......
55 A450 PROFFITT TX (55 WNW MWL) 12/1905
FTW/LSR 33199888
12 WNDG BRADY TX (49 NNE JCT) 12/1642
SIGNS DOWN. STEEPLE OFF CHURCH; TREES & POWER SJT/LSR 31139933
POLES DOWN.
2 G 56 DRYDEN TX (17 E P07) 12/1420
60-70 MPH WNDS; SPOTTER RPRT MAF/SVS 30051021

.........OTHER SEVERE REPORTS.........OTHER SEVERE REPORTS.........
91 A 75 ADDICKS TX (24 WNW HOU) 12/1215
DIME SIZED HAIL NR LAMAR HIGH SCHOOL HOU/LSR 29789565
15 B200 O45 (ORL) ORLANDO EXEC ARPT FL 12/1655
OV ORL 045008/TM 2255/FL010/TP PARO/TB ORL/UUA 28558133
2 IN DIA HAIL

The hourly log will contain all reports received by SPC from 0600 CST (12Z) through the latest full hour.

Monthly Tornado Statistics

The monthly tornado statistics are issued by SPC at irregular intervals. Let's look at the product:

ZCZC MKCSTAMTS
TTAA00 KNAW DDHHMM
STORM PREDICTION CENTER (NORMAN OK) ...THROUGH 6 AM CDT 02/15/99
STATISTICS FOR TORNADO TOTALS AND TORNADO RELATED DEATHS

............NUMBER OF TORNADOES............ NUMBER OF KILLER
TORNADO DEATHS TORNADOES
....1999.... ....1998.... 1997 1996 3YR 3YR

http://www.spc.noaa.gov/misc/about.html 2/17/2006
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MCCARTHY
NNNN

The statistics are broken down by month and contain data for the last four years. An "-" in a column means the data is missing or not yet available. There is also a column called "3 YR AVG" that gives the average number of tornadoes per month (based on the 3 years' data). In the 1998 columns under "NUMBER OF TORNADOES" there were 20 tornadoes initially reported in January under the PRELIM (preliminary) category. SPC does not include reports of "unconfirmed" or "possible" tornadoes in the PRELIM numbers.

When the digital Storm Data database arrives from the NWS Office of Meteorology, FINAL numbers go in that column. Those include removal of any erroneous/duplicate reports or added reports which were initially missed or misclassified. **The FINAL numbers are not whole tornadoes, but instead county-segments of tornado tracks**, which accounts for much of the increase between PRELIM and FINAL. The NWS uses county-segments because warnings are verified by county. For example: Tornado A stays in one county. Its whole path stays counted as 1. Tornado B is a long-tracker which crossed parts of 8 counties. Its FINAL breakdown is 8. Therefore, in most cases, the FINAL totals will be more than the PRELIM values, because of the county-segment breakdown.

The DEATHS columns are simply the number of people killed by month for the years 96 through 98 and the average killed (3 years) per month. The KILLERS columns represent killer tornado events for the current year and the 3-year average. A tornado is counted as a killer if one or more persons were killed. If 100 people were killed by a single tornado it would be counted as one killer event. Multiple killer tornadoes on the same day are counted as separate events.

Along the bottom of the report are totals for the columns and a simplified re-cap. For example, there were 1254 preliminary (PRELIM) reports of tornadoes in 1998, versus 1481 tornado segments FINAL through Dec 1, 1998.

**Killer Tornado Statistics**

The killer tornado statistics are issued by SPC at irregular intervals, as new information rolls in for this year's killer tornado events. Let's look at the product:

ZCZC MKCSTATIJ

http://www.spc.noaa.gov/misc/about.html 2/17/2006
The killer tornadoes are listed in the chronological order they happened, by DATE and CST TIME. LOCATION is self-explanatory. DEATHS is number of deaths in the whole tornado path -- not just the given location. The ABCD column letters represent the number of deaths:

- A = In tornado watch
- B = In severe thunderstorm watch
- C = "Close" to the watch (15 minutes or 25 miles)
- D = No watch in effect

If the tornado was in a watch, the watch type and number is given. For example, WT0012 is Tornado Watch number 12. If known, the F-scale damage rating of the tornado is listed; if not, a "?" mark is entered. The deaths are broken down by the following circumstances of the victims, if known:

- H = House (permanent foundation)
- M = Mobile home (a.k.a. "manufactured home")
- O = Outdoors (not inside any vehicle, mobile home or permanent building)
- P = Permanent structure (school, garage, factory, store, warehouse, truck stop, etc.)
- V = Vehicle (includes parked RVs)

Information for the killer tornadoes list comes from Local Storm Reports (LSRs) and Public Information Statements (PNS) issued by local NWS offices, supplemented by news from internal NWS event memos and Internet media accounts. Since killer tornado information -- especially death counts, circumstances and F scale, is often not complete until many days later, these numbers are very preliminary and subject to change as more information arrives.
development on that is underway. In this new system, SPC will draw irregular shapes that conform better to the patterns of the atmosphere than parallelograms; and computer programs will fit these shapes to counties. Local NWS offices will be able to add or remove counties from the SPC watch at their discretion, as is now the case.