Storm spotter

National Weather Service
Wichita, KS
Fall 2004 Newsletter

In this Issue

Figure 1. June 12, 2004 Mulvane Tornado Rated (F3)

Harper and Sumner Counties Become Magnets for Tornadoes in 2004 by Eric Schminke, Forecaster

The Spring and Summer months of 2004 were, like most of their predecessors, action-packed from a severe local storm viewpoint. However, for reasons unknown, mother nature appeared to possess ill will toward Harper and Sumner Counties. These two neighbors became prime targets for an incredible volley of severe weather throughout the Spring and Summer of 2004. The most alarming aspect was the number of tornadoes that paid visits to these two counties. Unfortunately, a hefty percentage of the twisters were significant, even to the point of drawing national attention.

The atmospheric chaos for Harper County began on the morning of April 23rd, when severe thunderstorms rumbled into Anthony. These storms unleashed 65 mph winds that blew the roof off a barn at 730 AM. Over three hours later, a second round of severe thunderstorms slammed Harper, where winds estimated at 70 mph uprooted a large tree that fell onto a mobile home. During the incident, a female occupant was seriously injured, sustaining fractured vertebrae, and required ambulance transport to Via Christi Medical Center. Just 6 miles south, on Highway 14,

winds clocked at 72 mph struck Chaparral High School. Although the hail accompanying the winds was only ¼ inch diameter, hail "drifts" reached 6 inches. Crop damage was extensive. Around 75% of the alfalfa, totaling 3,000 acres was shredded. Between 50 and 75% of the wheat crop, totaling between 150,000 and 172,500 acres, was destroyed. Shortly thereafter, at 1054 AM, winds estimated at 75 mph, destroyed the historic, 115-year old Red Barn in Harper that was under renovation. Three men working at the site were injured, including one requiring air med-evac to Wesley Medical Center where he was listed in critical condition. The severe thunderstorms would move east across Southeast Kansas through early evening, with severe thunderstorm winds reaching 75 mph whipping across Chautauqua County.

On May 12th, the first tornado outbreak arrived with a vengeance. Between 750 PM and 930 PM, 16 tornadoes roared across Harper County. Of these, one was violent, achieving rotational velocities of 207-260 mph, an F4 rating. Possessing a damage path 1.2 miles long and around 500 yards wide, the twister struck 3 miles southeast of Harper, destroyed a two-story farm house and five barns associated with the homestead, and five cars, their engines strewn across shaven wheat fields. Total damage: $275,000 to property; $75,000 to crops. Three tornadoes from this mini-outbreak achieved 115-159 mph rotational velocities, an F2 rating in each instance**.** The tornadoes struck Attica, where one house was unroofed and two metal barns were destroyed; between 4 and 5 miles southeast of Harper, where a farmstead was hit, as was a veterinarian's clinic which had it's roof sheared off; and the top floor of a two-story house; and one mile southeast of Harper, where the top floor of a two-story house was blown off. The three twisters caused an estimated $380,000 damage. One tornado, achieving rotational velocities of 75-114 mph, an F1 rating, threatened Chaparral High School, where the twister ripped off the press box at the football field and peeled back part of the roof of a concessions stand.

On May 29th, five more tornadoes menaced Harper County. Of these, one achieved rotational velocities of 115-159 mph, an F2 rating. This tornado possessed a track 8 miles long, and around 500 yards wide. The tornado spent the majority of its life over the countryside. However, one house was unroofed with most belongings lost. Wheat fields were heavily damaged (an estimated $200,000), with the house sustaining $175,000 damage. The twister tracked from 3 miles northeast of Harper to 2 miles north-northwest of Freeport. This storm then made its turn towards Sumner County.

At 842 PM, the first of two F3 tornadoes, possessing rotational velocities of 160-205 mph, menaced Conway Springs. Starting 3 miles south-southeast of Conway Springs, the 600-yard wide monster leveled 15 farm dwellings and service buildings, destroyed 25 pieces of farm equipment, many miles of transmission line, and rendered the wheat crop an almost total loss. The twister slammed into several homes along Highway 49. One modular was completely removed. A woman in her mobile home was thrown an unspecified distance. Fortunately, she survived. Total damage: $1.78 million to property, $100,000 to crops. Damage path length: 2.5 miles. At 852 PM, the 2nd F3 struck 2.5 miles east-southeast of Conway Springs. Possessing a track 2.5 miles long and around 500 yards wide, this beast caused $1 million damage; the majority to two homesteads.

On June 12th, a 3rd round of tornadoes struck. This time, Sumner and Cowley counties were the targets for five of seven tornadoes. Four of the twisters were small and remained in open country,

while one was major. An F3 roared into areas 1 to 5 miles southeast of Mulvane. The tornado caused $500,000 damage to property, and $75,000 to crops. **See Figure 1. This tornado illuminated the pitch-black sky with a rainbow arcing in the background.** Video of the tornado was shown on all of the major cable news networks**.** Two people were injured when their home suffered a direct hit. Two more twisters occurred that evening, but they occurred on the countryside in Elk County.

July arrived with a bang – literally, as the atmosphere put on a fireworks display of it's own for the 4th of July weekend. That evening, severe thunderstorms, packed with winds of 60-70 mph winds, lit skies with cloud-to-ground lightning. The thunderstorms rampaged across nearly all of the Wichita County Warning Area from the 4th to the 7th. On the 7th, a "mini-outbreak" of short-lived twisters took place in Russell County. One tornado did achieve rotational velocities of 75-114 mph, an F1 rating, when it struck two homes from 9 miles south to 9 miles southeast of Russell. Property damage: $100,000. This event also included an estimated 80 mph gust 6 miles northwest of Milberger in southwest Russell County.

The storms continued into August, with a tornadic event on the 27th that struck again in Sumner County. That evening, two tornadoes, one rated F2**,** struck Sumner County, with one dropping into Northwest Cowley County. The F2 struck two miles south of Wellington, where it unroofed one home and collapsed one wall. Fortunately, no one was injured.

Woodson County had the most destructive hailstorm for the entire County Warning Area last season. During the night of June 11th-12th, at 115AM, baseball-sized hail woke up Yates Center, causing $97,200 damage to property, and $21,600 to crops. Windows were shattered across town, including the courthouse, a hardware store, and a restaurant. Roof damage was equally extensive.

As of this writing, 58 tornadoes visited the Wichita County Warning Area premises during the 2004 season. Of these, 32 struck Harper and Sumner counties. Fortunately, there were no fatalities, and very few injuries. The lead times for most of these tornadoes were impressive, with some as much as 25 minutes. A major reason for such impressive statistics is due to a very dedicated spotter network across Central, South-Central, and Southeast Kansas. You folks are an invaluable asset to the severe weather warning program of WFO Wichita, and the public is indebted to your service.

Record Soggy/Cool Summer by Andy Kleinsasser, Forecaster

As opposed to the summer of 2003, the summer of 2004 will likely be remembered for being wetter and cooler than normal for several locations across central and southeast Kansas. To clarify, "summer" in this article is referred to as "meteorological summer"—June through August. In contrast, June 21st through September 21st is referred to as "astronomical summer". Additionally, "normals" for all sites are calculated from the 1971-2000 time frame, while records for Wichita date back to 1888.

Wichita recorded its 8th wettest summer on record, with the official rain gage at the Mid-Continent airport measuring 17.09 inches—6.59 inches above normal. June is typically the

wettest month, and certainly lived up to its name as the "bucket" measured a whopping 8.04 inches, a 3.79 inch surplus. June was only 0.28 inches away from breaking into the top ten wettest Junes on record. However, July's 6.88 inches was enough to tie 1906 at the 9th position for wettest Julys. Interestingly enough, August ended up below normal in the rainfall department, measuring a relatively meager 2.17 inches—a deficit of 0.77 inches. The greatest 24 hour rainfall total was 2.57 inches, which occurred on July 23rd.

As one would certainly expect, a wet summer often correlates to a cooler than normal temperatures, which was precisely the case. Wichita tied 1903 to move into the 10th position for coolest summers (the official thermometer is located at the Mid-Continent airport). The average June through August temperature (an average of both high and low temperatures over the three month span) was 75.4 degrees, 3.4 degrees below normal. Of the three months, August was surprisingly the only month that broke into the top ten "cool list" for its prospective month, ranking 9th at 75.4 degrees—4.4 degrees below normal.

Furthermore, Wichita reached or exceeded the century mark a measly 3 times during the summer of 2004—a stark contrast to the 21 steamy 100+ days during the summer of 2003. Additionally, on only 27 of the 92 days that composed June through August 2004 did the mercury reach at least 90 degrees, as opposed to the 50 days during the summer of 2003 that the mercury reached 90 degrees. Surprisingly, the summer of 2003 was only slightly above normal in the temperature department, with an average temperature of 79.7 degrees. 11.37 inches of rain was measured last summer, also slightly above normal.

The warmest high temperature recorded at the Wichita Mid-Continent Airport during the summer of 2004 was 101 degrees on July 20th. The warmest low was a sultry 76 degrees during the early morning hours of both July 16th and August 3rd. The coolest high was a relatively chilly 70 degrees on July 24th, and the coolest low was a "bone chilling" 50 degrees on June 1st.

But obviously not everyone in our county warning forecast area lives in Wichita, so included below is a sampling of summer 2004 climate information from a few other sites around central and southeast Kansas.

Chanute (deficit/surplus in parenthesis):

Summer Precipitation (inches)…15.65 (+2.40)
- June…7.86 (+2.81)
- July…5.22 (+0.98)
- August…2.57 (-1.39)

Most Rain in 24 Hours…1.56 inches on 7/2
Average Temperature (F)…73.8 (-3.5)
- June…72.1 (-2.2)
- July…75.5 (-4.0)
- August…73.8 (-4.2)

100+ days:
- 2004…0
- 2003…11

90+ days:
2004…18
2003…47
Warmest High…96 on 7/13, 7/20, 8/26
Warmest Low…75 on 7/14, 8/26
Coolest High…68 on 7/29
Coolest Low…47 on 8/12

Salina (deficit/surplus in parenthesis):
Summer Precipitation (inches)…9.28 (-2.68)
June…2.46 (-1.69)
July…5.78 (1.46)
August…1.04 (-2.45)
Most Rain in 24 Hours…2.15 inches on 7/24
Average Temperature (F)…76.3 (-2.5)
June…73.9 (-1.7)
July…78.7 (-2.6)
August…76.4 (-3.0)
100+ days:
2004…11
2003…25
90+ days:
2004…39
2003…63
Warmest High…105 on 7/20
Warmest Low…82 on 7/21
Coolest High…67 on 7/24
Coolest Low…50 on 6/1

Outlook for Winter 2004-2005 by Eric Schminke

Now that October has arrived, one's thoughts often turn toward this topic: "What type of winter can we expect this season?" This article will attempt to answer that question.

As most, if not all, of you have heard, a weak El Nino has been in progress since early June, when warmer-than-normal sea surface temperatures began to expand east from the tropical Central Pacific toward the tropical Eastern Pacific; more specifically, that region bounded by the Equator and 25 degrees north latitude, and between the International Date Line and the Pacific coasts of Central and South America (about 80 degrees west longitude). During this 3-month period, sea surface temperatures across this region have been, on average, 28-30 degrees Celsius (82-86 degrees Fahrenheit), 0.5-1.0 degree Celsius above normal.

Considering the duration over which such temperatures have been observed, this constitutes a weak El Nino. During this same 3-month period, the warmest temperatures, 30-31 degrees Celsius, have been generally observed just off the Pacific coast of Central America. Such an event can play a role on winters across the United States, especially from the west coast, across

the Upper Midwest to the Great Lakes, and across the southern plains to the gulf coast. Since Kansas is located in between these two regions, more detailed research is required.

When an El Nino event occurs, even a weak one, the unusually warm sea surface temperatures in the tropical Eastern Pacific induce showers and thunderstorms (also known as deep tropical convection) to develop further east than when sea surface temperatures across these areas are normal or cooler than normal. As a result, fairly persistent troughing often results along, or just off, the west coast. This troughing will induce winter storms to assume a more southerly track, that is, one that would more likely carry them east/northeast across Texas and Oklahoma, resulting in an increased potential for below normal temperatures and above normal precipitation for these two states, (especially in Texas). The upper-level jet stream also strengthens over these areas. Across the northern plains, from the Dakotas to the Great Lakes, the reverse often results; an increased potential for above normal temperatures and below normal precipitation during the winter, especially toward the Mississippi and Ohio Valleys where closer to more persistent high pressure ridging.

Considering the above factors, here's what one may expect this winter: (December, 2004 to March, 2005)

Overall:
Temperatures: Fairly close to normal except for perhaps Russell, Lincoln, Barton, and Ellsworth counties, where closest to areas where higher probabilities for above normal temperatures are forecast.

Precipitation: Fairly close to normal except for those counties near the Oklahoma border, (especially Harper, Sumner, Cowley, Chautauqua, Montgomery, and Labette) where closer to areas where higher probabilities for above-normal precipitation are forecast.

Fine-tuning the forecast:

For November-Mid December: It appears temperatures will be close to normal with best chances for above normal precipitation targeting South-Central Kansas.

For Mid December-Mid February, 2005: Temperatures across Central Kansas *gradually* trending toward above normal, with best chances for above normal precipitation *gradually* shifting toward Southeast Kansas.

For Mid February-March, 2005: Near normal temperatures and precipitation area-wide.

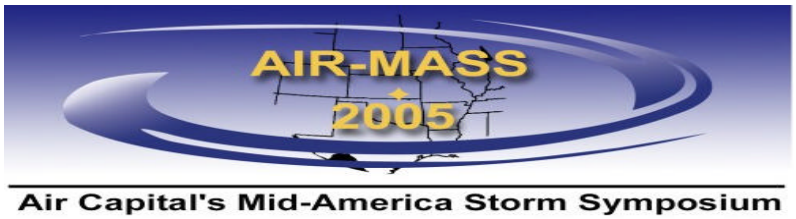
<u>Keep the following in mind: The probabilities for above normal/below normal temperatures/precipitation do not take into account magnitudes of above/below normal. These are general outlooks over approximately a 2-month period.</u>

SkyWarn Proves Vital by Robb Lawson, Forecaster

With the active severe weather season we had in 2004, SkyWarn volunteers proved to be a vital source for severe weather information. Some of you may ask; what is SkyWarn? SkyWarn (formed in the early 1970s) is the National Weather Service (NWS) program of volunteer severe weather spotters. SkyWarn volunteers support their local community and government by providing the NWS with timely and accurate severe weather reports. The focus of SkyWarn (and of the NWS) is simple…to save lives and property.

Amateur Radio continues to be an integral part of the SkyWarn program. Every Tuesday at 7pm an Amateur Radio net is conducted on the 146.820 repeater (near Hutchinson), and at 730pm another net is conducted on the 145.130 repeater (near Beaumont). The purpose of the SkyWarn net is to provide a link between the NWS and amateur radio operators, to be used to enhance the gathering and distribution of critical severe weather information. The routine weekly net also allows the National Weather Service to notify SkyWarn volunteers of upcoming events and other important information. This net is open to all licensed Amateur Radio operators.

December 4th 2004 have been designated SkyWarn Recognition Day, which celebrates the contributions that amateur radio operators make to the severe weather program. During this day, amateur radio volunteers are welcome to come out to the office and see first hand how amateur radios fit in to the severe weather operations at the National Weather Service Wichita Forecast Office. For additional information on the SkyWarn program, feel free to email Chance Hayes at Chance.Hayes@noaa.gov



Wichita to Host Exciting Regional Storm Conference (AIRMASS 2005) by Pete Wolf-Scientific Operations Officer

The Wichita, Kansas, Chapter of the American Meteorological Society is pleased to announce plans for the Air Capital's Mid-America Storm Symposium (AIRMASS 2005). This will be a 2-day regional science-sharing conference, to be held April 14-15 2005 at the historic Radisson Broadview Hotel in downtown Wichita. The purpose of the conference is to bring government and private sector meteorologists, media meteorologists, university teachers and students, storm spotters/chasers, and other weather enthusiasts together to share science. The focus is on new tools, techniques, and ideas for improved forecasting and warning of hazardous weather conditions that affect the central United States. These conditions include severe thunderstorms and tornadoes, floods, winter storms, and aviation hazards.

A highlight of the conference is the commemoration of the 50th anniversary of the deadly Udall, Kansas tornado. This historic event will be reviewed, along with the history of the warning program, weather radar, and the spotter program. We will have several guest speakers, including renowned radar expert Don Burgess of the National Severe Storms Lab (retired).

Another highlight of the conference will be the banquet dinner at the world renowned Kansas Cosmo sphere and Space Center in Hutchinson during the evening of April 14th. In addition to a banquet dinner and access to the museum, Dr. Hugh Christian of the Lightning Research Team (at Marshall Space Flight Center) will give a presentation on lightning research from space. Transportation to and from the Cosmo sphere will be available from the Radisson Broadview Hotel.

For more details about the conference, please refer to the following web site: www.wichita-amsnwa.org and click on AIRMASS 2005. Registration is required through our web page, as space will be limited. The pre-registration fee (prior to February 25, 2005) for the conference itself is $50. The banquet dinner at the Kansas Cosmo sphere is an additional $30 (includes dinner, presentation, and museum admission). Chartered bus transportation will be available for $15 round trip from Wichita.

If you have any questions, please direct them to Peter Wolf, AMS Wichita Chapter President, at peter.wolf@noaa.gov.

How Accurate is the Forecast? by Kevin Darmofal, Lead Forecaster

The Wichita National Weather Service has a local verification program, which compares daily forecasts of temperature (High and Low) and probability of precipitation. Four sites within the County Warning Area (CWA), or area of forecast responsibility, are used to compare local (human) forecasts, versus objective (computer model) forecasts. Data from the Automated Surface Observing Systems (ASOS) at Wichita (ICT), Chanute (CNU), Russell (RSL), and Salina (SLN) are used to verify the forecasts. The first 48 hours (roughly four-12 hour periods) of a forecast cycle are compared, twice daily, beginning at 12UTC (6am LST), and 00UTC (6pm LST). The minimum temperature is verified for the period from 6 pm to 7 am LST, and the maximum temperature from 6 am to 6 pm LST. The precipitation forecasts also correspond to these same time periods.

Temperature forecast accuracy is measured by calculating the average absolute error (AAE) for a particular forecast period, or accumulated periods. The smaller the value (or error) the better.

$$\text{Example: } \frac{/\text{forecast T} - \text{observed T}/}{\text{\# of observations}}$$

Comparisons are made between the human and computer forecasts to assess skill. The goal of your NWS forecast meteorologist is to not only provide an accurate forecast, but to also “add value” or improve upon the computer model guidance which is used. This is measured by comparing the AAE scores and coming up with a percent improvement score, between the human and computer forecasts.

The verification scheme used for precipitation is a little less accurate in assessing forecast skill. This is mainly due to the fact that we trying to relate probabilities of occurrence to a specific point in the forecast area of concern. The standard statistical method used is the Brier score, which is the mean square error applied to probability forecasts.

$$\text{Example: } \frac{(\text{forecast PoP} - \text{OBS})^2}{\#\text{ of observations}}$$

The forecast probability (PoP) ranges from 0 to 1, for instance, 50% would be .5. If measurable precipitation occurs, OBS is set equal to 1, or if no precipitation, or trace is recorded, then OBS is set equal to zero. The lower the Brier score, the better the forecast. Comparisons can then be made to show percent improvement between the human and computer forecasts, similar to temperature forecasting.

The Wichita National Weather Service posts seasonal (quarterly) and annual verification statistics, using the methods described above, on our web page. From our main page, under the *Forecast* section, click on *Local Area*, then look for *NWS Wichita Forecast Verification Statistics.*

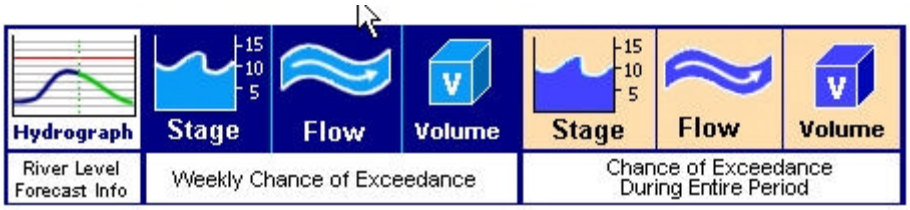
AHPS by Janet Spurgeon, Hydrologist

AHPS – Advanced Hydrologic Prediction Service is about deploying newer science and technology to help users make better informed decisions. The need for AHPS is apparent when flooding ranks as the highest cause in average annual deaths per year than for any other severe weather phenomenon and average annual costs in damage exceeds 5 million.

We now have 6 new probabilistic AHPS graphics on our website to better serve your needs. These probabilistic river forecasts are for stage (ft), flow (cfs), and volume (ac-ft). Of these 6 graphics, half of the graphics show a weekly bar plot for the chance of river levels exceeding a particular value in a 90 day period. The remaining graphics depicts the chances (in a percentage) of river levels exceeding a specific height some time during the forecast period. This plot shows a conditional simulation compared to the historical simulation. The line through the points represents the distribution that has been fit to those sample points. The conditional simulation line indicates chances of the river going above given levels based on current conditions while the historical simulation line indicates the chances of the river going above given levels based on the total range of past values. By comparing these lines, you can ascertain whether the chances are greater for wet or dry conditions.

A picture is worth a thousand words. So go to our website at:

http://www.crh.noaa.gov/ict and then click on the AHPS link on the left column.
You will be taken to an areal map of our river gage sites. Choose a river gage site with the circle icon as these sites have the probabilistic graphics. Then look for the following graphic as shown below and click on the links.



Time for Winter Weather Reporting by Chance Hayes-Warning Coordination Meteorologist

Just because the winter season has rolled around, doesn't mean that your job of a volunteer is over until the spring severe weather season begins. We at the National Weather Service still need your services and support. You can help us by relaying information on the type of wintry precipitation (snow, sleet or ice) that may be falling at your location. Then, once the precipitation starts to accumulate, we would appreciate a report on how deep the ice or snow is. This type of information is critical in fulfilling our mission of protecting lives and property.

Espotter is one way other than the telephone to relay your reports to our office. Espotter is an internet reporting system that feeds directly into our office. It is very easy to use, as we have supplied a very easy to follow reporting form. Please visit the following web site and make your reports through Espotter. If you have yet to sign up for this program, remember to register with the Wichita NWS office.

http://www.crh.noaa.gov/espotter

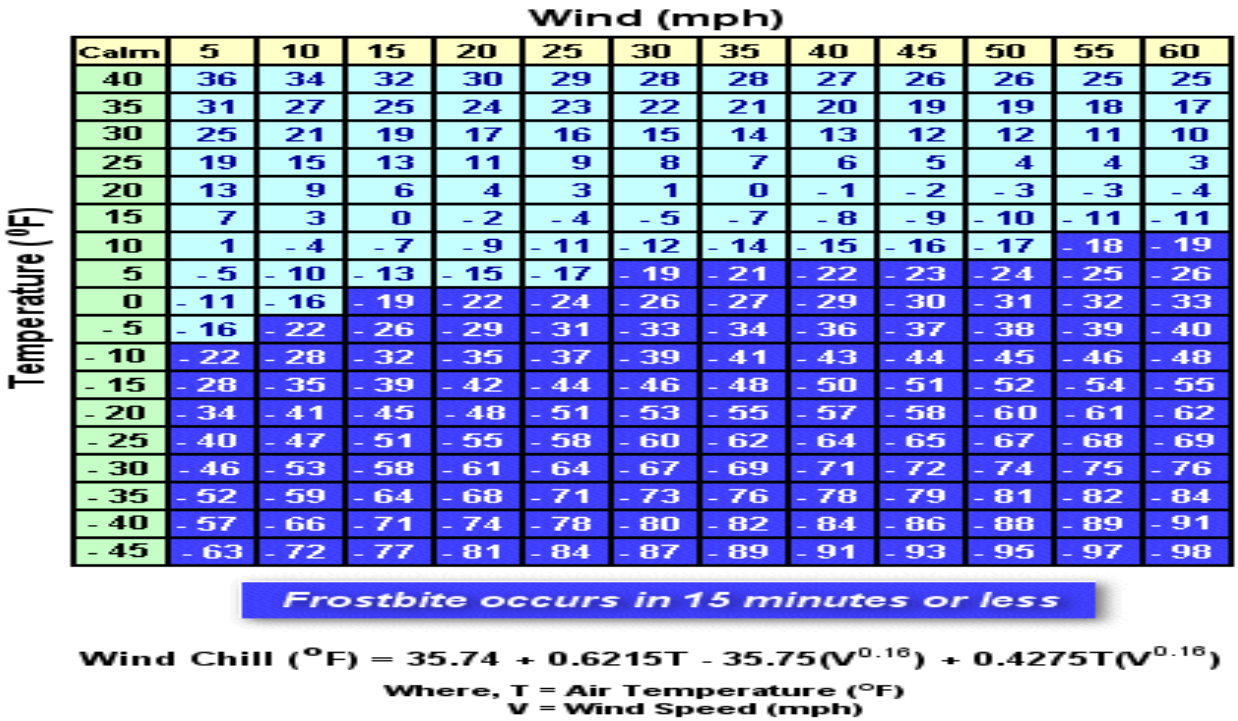
Outreach Opportunities by Gloria Dill, Administrative Assistant

The National Weather Service Office in Wichita, Kansas, strives to educate the public (both children and adults) on all aspects of Weather Safety such as Tornadoes, Thunderstorms, Lightning, and Flash Floods. Some of the Outreach Opportunities we offer at no charge to the public are:

1. Weather Presentations with dramatic video and safety for different age groups
2. Safety Fairs in malls and other locations.
3. Career and Science Fairs at schools.
4. Businesses and Industries

If interested, please contact Gloria Dill at (316) 942-8483, Ext. 221 or Chance Hayes at Ext. 726. Thank you.

New Wind Chill Chart



Wind (mph)

Temperature (°F)	Calm	5	10	15	20	25	30	35	40	45	50	55	60
	40	36	34	32	30	29	28	28	27	26	26	25	25
	35	31	27	25	24	23	22	21	20	19	19	18	17
	30	25	21	19	17	16	15	14	13	12	12	11	10
	25	19	15	13	11	9	8	7	6	5	4	4	3
	20	13	9	6	4	3	1	0	-1	-2	-3	-3	-4
	15	7	3	0	-2	-4	-5	-7	-8	-9	-10	-11	-11
	10	1	-4	-7	-9	-11	-12	-14	-15	-16	-17	-18	-19
	5	-5	-10	-13	-15	-17	-19	-21	-22	-23	-24	-25	-26
	0	-11	-16	-19	-22	-24	-26	-27	-29	-30	-31	-32	-33
	-5	-16	-22	-26	-29	-31	-33	-34	-36	-37	-38	-39	-40
	-10	-22	-28	-32	-35	-37	-39	-41	-43	-44	-45	-46	-48
	-15	-28	-35	-39	-42	-44	-46	-48	-50	-51	-52	-54	-55
	-20	-34	-41	-45	-48	-51	-53	-55	-57	-58	-60	-61	-62
	-25	-40	-47	-51	-55	-58	-60	-62	-64	-65	-67	-68	-69
	-30	-46	-53	-58	-61	-64	-67	-69	-71	-72	-74	-75	-76
	-35	-52	-59	-64	-68	-71	-73	-76	-78	-79	-81	-82	-84
	-40	-57	-66	-71	-74	-78	-80	-82	-84	-86	-88	-89	-91
	-45	-63	-72	-77	-81	-84	-87	-89	-91	-93	-95	-97	-98

Frostbite occurs in 15 minutes or less

$$\text{Wind Chill } (^{\circ}\text{F}) = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T = Air Temperature (°F)
V = Wind Speed (mph)

Comments and suggestions are always welcome.
Please phone, e-mail or mail us at:
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2142 S. Tyler Rd.
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You can also view this newsletter on-line at:/www.crh.noaa.gov/ict

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