Topeka News

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Special points of interest:

- Curious what is done with your severe weather report? Check out our lead story!
- Bill Gargan takes us through another of his fascinating chase stories—this time through Texas in 1995.
- Heat safety tips for this summer.
- Take a look to see what the NWS-Topeka has been up to the past quarter of the year.

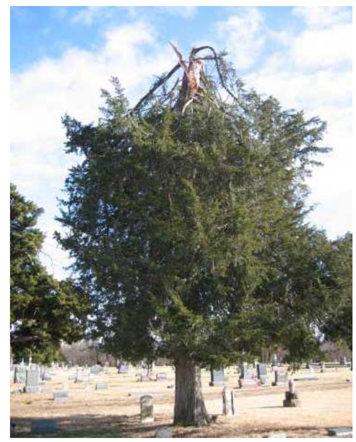
Inside this issue:

Storm Data—Home of Severe Weather Reports

Picture this—A severe thunderstorm warning is issued for your town. Therefore, you head to the basement, and monitor your NOAA All-Hazards radio for the latest information on the storm. From downstairs, you're able to hear hail pelting your roof, and note the time. Once the warning is cancelled for your area, you head back upstairs and see that golf ball sized hail is covering the ground outside. You call the National Weather Service in Topeka, and dictate your report: My name is Joe Smith, spotter number TS314 in Test City. At 8:14pm, golf ball sized hail fell at my home. A meteorologist at the National Weather Service takes down this information. **Where does this information go?**

The National Weather Service Office in Topeka will use this information immediately as the basis for the issuance of a severe thunderstorm (or if applicable tornado) warning, or as follow-up information in any ongoing warnings. NWS-Topkea will also issue a Local Storm Report (LSR). This is sent to local media outlets, and posted on our website (http://www.crh.noaa.gov/product.php?site=TOP&product=LSR&issuedby=TOP). The Storm Prediction Center also immediately plots nationwide storm reports (http://www.spc.noaa.gov/climo/). A strict quality control of these reports is done in real-time (expect NWS meteorologists to ask several questions if you speak with one on the phone), and again after an event --especially regarding the location of received reports.

Recently, the NWS-Topeka office has taken steps to "geocode" or to assign latitude/longitude coordinates to the homes or work places of storm spotters across their warning area. This ensures that the location of each report is accurately recorded and plotted.



A tree was sheared off at the top by severe thunderstorm winds January 8th.

Public reports of severe weather, or those from storm spotters that are not currently listed in the local database, are given a latitude/longitude based on their location from the clos-

June 2nd, 1995 Chase by Lead Forecaster Bill Gargan

While attending the University of Oklahoma's graduate program in meteorology I had the opportunity to participate in project VORTEX (Verification of the Origins of Rotation in Tornadoes Experiment) during 1994 and 1995. I was assigned to drive Probe 1—a sedan that had meteorological instrumentation mounted to the roof of the car. There were 8 to 10 such vehicles that were part of the VORTEX armada. Each Probe was assigned to a specific point around a severe thunderstorm to sample the environment. The instrumentation on each Probe measured wind speed, wind direction, surface pressure, temperature and relative humidity. Probe 1 was assigned to follow the Forward Flank baroclinic zone (a boundary that often develops between a supercell's precipitation core and the warm moist inflow that feeds the storm) towards the center of the storm's updraft. I was teamed up with the famous

The beginning of the Fiora tornado, just southwest of the town. Photo from a video still filmed by Meteorologist Bill Gargan.

Spring Climate Review

Warm, spring-like temperatures were slow to make an appearance in northeast Kansas this year. During January, the mercury only climbed above 60 degrees on two days of the month in Topeka—the 27th and 28th. Low temperatures fell below zero on the 19th and the 24th of the month. Despite the cool readings, the average monthly temperature of 28.7 degrees was 1.5 degrees above the climatological normal. Several mild days near the beginning, and again toward the end of the month helped to balance the chilly days. February went in the books seeming a bit warm. The high temperature on fourth day of the month climbed above 60 degrees. Four days thereafter saw highs above the 50 degree mark. Despite this, the average monthly temperature came in 3.5 degrees below the climatological normal. Minimum temperatures were in the chilly single digits the 6th, 7th, and 20th, which dragged the average daily temperatures to the cool side. The month of March was capped off by 72 degree days on the 1st and 31st. Only one other 70 degree day was recorded during the month. The 72 degree day on the 1st may have seemed quite pleasant to residents of Kansas—but this feeling was quickly squashed when a strong cold front dove southeastward through the afternoon hours of the 2nd. Temperatures ahead of the front soared into the middle 60s to lower 70s in the southwesterly flow regime, but took a quick nose dive in the cold airmass that streamed south-

"The temperature at Topeka plummeted 22 degrees in one hour on the 2nd [of March] behind the front."

ward behind the front. The temperature at Topeka plummeted 22 degrees in one hour on the 2nd behind the front. The 69 degree high temperature during the morning hours of the second the 2nd was followed by a chilly day the 3rd, when the highest temperature recorded at Topeka was only 36 degrees. The March temperature average came in 2 degrees below normal. The first 80 degree day of the year didn't come until April 20th. The average date of the first 80 degree day is April 4th. April came in the 21st coldest on record at Topeka.

The month of January came in a few tenths of an inch of liquid equivalent precipitation below normal. Topeka saw 0.95" of liquid equivalent precipitation—0.30" below normal. 4.7" of snow was recorded. February ended on the wet side. Several winter weather systems tracked across the region during the month, and measurable precipitation fell on 7 of February's 29 days. A storm system that passed during a 24 hour period that spanned the 5th and 6th of the month brought 7.3" of snow to Topeka. 3.32" of liquid equivalent precipitation (2.14" above normal) and 10.5" of snow were measured in the city for the month. March and April precipitation was near normal for the city of Topeka.

Northeast Kansas has thankfully missed out on significant, widespread severe weather events during the first quarter of the year, but there were still a few active days and nights of note. On the 7th and 8th of January, severe thunderstorms brought straight-line wind damage to portions of Coffey and Anderson counties in east central Kansas. Winds were estimated to be in the 70 to 80mph range, and managed to shear off the top half of several large telephone poles, tear the roof off of a carport, and cause tree damage at several spots in the county. No severe weather events were notable during the month of February, But on the 21st, the environment was characterized vertically by a tongue of warm air in the midlevels of the atmosphere, and cold near surface temperatures. Thunderstorms that developed allowed for robust production of sleet.

Up to 2" of sleet accumulated in portions of Anderson and Coffey counties during this time. The next severe weather event didn't come until the end of March. Severe thunderstorms developed across north central Kansas overnight the 30th/31st. These storms dropped hailstones up to the size of golfballs across counties in eastern Kansas as they pushed eastward. A second complex of storms tracked eastward across southeastern Kansas along a warm front stretched across the region. A broad area of light precipitation developed north of these storms in the anvil portion of the thunderstorms. Mid-level wind speeds through a relatively dry layer of the atmosphere were a sustained 55 to 65 mph. Precipitation fell through this dry, mid-level layer. The precipitation evaporated in the dry mid-levels, which caused this layer to cool and descend. This newly cooled airmass developed enough downward momentum to drag the layer of 55 to 65mph speeds down to the surface. Gusts to 70 mph were both measured and estimated at the surface across portions of east central Kansas. There were also several reports of shingle damage, and damage to road signs and tree limbs. The roof of the Lyndon High School (Osage County) was also reported to have been blown off. The month of April was a bit more active severe weather-wise. A single report of severe hail was received on the 8th. The tenth and eleventh of the month saw large hail and damaging straight line winds as a bow echo raced across east central and portions of northeast Kansas. Strong storms

Heat Safety

Despite the chilly start to the year (see page 2), summer warmth is on the way. Kansas residents take advantage of the longer days and warmer temperatures, and spend a significant amount of time outdoors between May and September. Typically, this is time well spent. Unfortunately, prolonged exposure to the sun's rays and extreme heat can have devastating consequences.

Sunburn: Ultra violet (UV) radiation is a portion of the sun's rays. Skin is sensitive to these UV rays. Prolonged, unprotected exposed to UV radiation can damage and kill skin cells. The body reacts by sending white blood cells to the damage site to remove the dead skin cells. The increased blood flow causes the red color and sometimes swelling associated with sunburn. Extreme sunburn can result in blisters, fever, or headaches.

Heat Cramps: Develop as a result of working or exercising in a warm to hot environment. Symptoms include painful muscle cramps, typically in the legs or the abdomen and excessive sweating.

Heat Exhaustion: A heat illness that may affect an individual after several days of exposure/activity/exercise in a warm or hot temperatures, often coupled with insufficient water and electrolyte consumption. Symptoms may include excessive sweating, cool and pale skin, muscle weakness, fainting, and sometime vomiting.

Heat Stroke: A heat illness similar to heat exhaustion in that several days of exposure/activity/exercise in a warm to hot environment coupled with inadequate water and electrolyte consumption may lead to symptoms. The first symptoms of heat stroke typically are the loss of the ability to sweat, and an elevated body temperature. Sweating is the body's natural cooling mechanism. Inability to sweat will naturally force one's body temperature upward in a hot environment. Other symptoms include a rapid pulse, rapid and shallow breathing, dizziness or lightheadedness, nausea, or fainting.
Consult a physician, or visit the National Weather Service Heat Safety information page (http://www.weather.gov/om/brochures/heat_wave.shtml) for treatments options.

What does the NWS-Topeka office do in the event of a prolonged period of extreme heat?

Heat Advisory: Issued when the daytime **Heat Index** is expected to be around 105°F and/or the maximum temperature is greater than or equal to 100°F.

Excessive Heat Watch: Issued when conditions are favorable to meet the criteria for an Excessive Heat Warning in the next 24 to 48 hours.

Excessive Heat Warning: Issued if the maximum **Heat Index** is expected to be around 110°F degrees and a minimum **Heat Index** around 75°F or higher will persist for at least a 48 hour period.

So, what is the "Heat Index?"

A measure of the "apparent" temperature. In other words, the **Heat Index** is a measure of how hot it feels when the relative humidity is added to the actual air temperature.

Temperature (°F)

Relative Humidity (%)

	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
85	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Probability of Contracting a Heat Disorder with Prolonged Exposure or Strenuous Activity

Caution	Extreme Caution	Danger	Extreme Danger

June 2, 1995 Chase Continued…

severe storm and tornado researcher Dr. Bob Davies-Jones. I was responsible for driving the Probe1 vehicle and Bob was navigator and communicator.

On June 2, 1995 Project Vortex-95 targeted the dry line across the western Texas Panhandle. The forecast was for an upper level trough over the desert southwest to move east into West Texas. Gulf moisture was poised to move north ahead of the dry line across west Texas during the afternoon hours.

The Vortex Armada left the Severe Storm Laboratory in Norman, OK around 11:00 AM with an initial target of the dry line about 50 miles southwest of Amarillo, TX. During our journey west on I-40, we entered the eastern Texas Panhandle and noticed that storms had already formed on the east side of the axis of deep gulf moisture. Initially these storms looked to have elevated bases but one storm right along the interstate about 40 miles east of Amarillo develop a rotating wall cloud that we sat and

The Friona Tornado. Still picture taken from a video shot by Meteorologist Bill Gargan.

"We were nearly under the wall cloud 5 miles southwest of Friona, TX and noticed that there was rapid rotation developing."

watched for about 5 minutes. The armada continued to push west knowing that storms that developed later during the afternoon along the dry line had a chance to become more intense supercell thunderstorms.

We continued west to the dry line which was located west of Clovis, NM at 4:00 PM. The Vortex Armada instrumentation sampled the dry line for about half an hour before Towering Cumulus clouds started to develop along the dry line. Eventually a cumulonimbus cloud developed south of Clovis. As the new storm moved northeast along Highway 60 into TX, it became severe and produced quarter size hail. The storm was high based and didn't develop a wall cloud. The VORTEX-95 field commander was Dr. Eric Rassmussen, who informed us that the storms that developed over the eastern Texas Panhandle earlier in the afternoon had produced an outflow boundary that was moving southwest into the western Texas Panhandle. North and east of the outflow boundary, the moisture was richer and temperatures were cooler, though the instability was greater. Both Bob and I hypothesized that once the storm crossed the boundary they would really intensify and the bases of the storms would lower and provide a better chance for the supercell to spawn tornadoes.

As we moved northeast towards the town of Bovina, TX the severe high based thunderstorm we were chasing began to intensify and a wall cloud started to form. We both knew the storm must have been crossing the outflow boundary and was tapping into the higher moisture east of the boundary. As the storm continued to push northeast, the wall cloud began to rotate. We could also see convective clouds within the updraft become crisper—even the south side of the storm's anvil became very sharp and pronounced looking. Most of the other Vortex vehicles south and west of the storm were reporting near zero visibility due to blowing dust as the inflow into the storm increased. Since our probe (Probe 1) was northeast of the updraft, we weren't bombarded with much blowing dust. As we approached the updraft, our east winds became a bit weaker. We were nearly under the wall cloud 5 miles southwest of Friona, TX and noticed that there was rapid rotation developing. We let our field commander know about the rapid rotation and he relayed this report to the National Weather Service in Amarillo, TX. We continued to stay just ahead of the rotating wall cloud as we drove northeast on US Highway 60. The storm was moving parallel to the highway toward the town of Friona. Suddenly, we saw a funnel dip down from the wall cloud. Then all of sudden, we saw dirt being kicked up in the air (Picture on Page 1). We reported the tornado to our field commander who passed the first report of a tornado 3 miles southwest of Friona to the National Weather Service in Amarillo.

Our forward speed slowed down as we passed through the town of Friona. I didn't notice that Highway 60 took an eastward jag through the town. The tornado was about 1 mile south-southwest of us as we went through the west side of town. As we approached the east side of Friona, the tornado was much closer to us. We could actually see the tornado clearly pick up debris in the form of pieces of buildings as it began to close in on us. Since I thought we were traveling to the northeast I was concerned that the tornado had picked up forward speed and started to turn a bit farther north. I was worried that the tornado would over take us shortly. Then, I noticed that

June 2, 1995 Chase Continued…

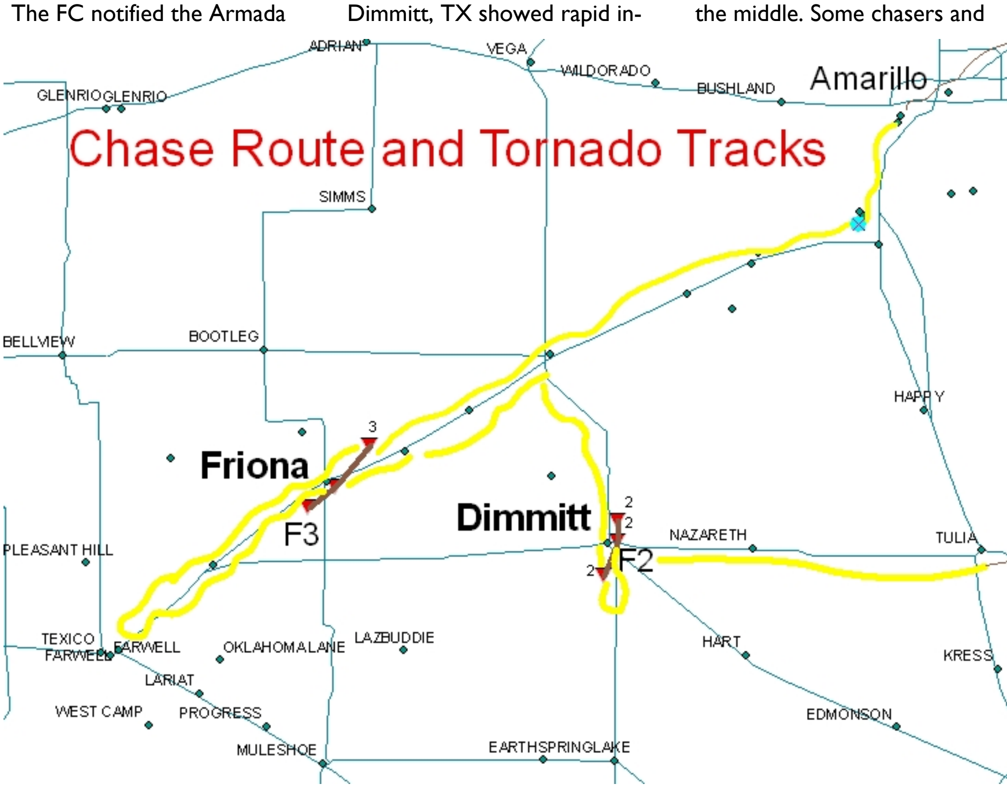
the road took a turn to the left, and finally realized that we had been heading due east and now we were headed northeast. Now, the tornado was just behind us, and a Purina feed mill in the path of the tornado toppled to the ground just a few thousand feet back. I knew I couldn't stop driving the car, or else we would get hit by the tornado. I tried to pick up speed. The inflow winds into the tornado were so strong from the northeast that the car was barely able to accelerate at all. I started to worry as I pushed the accelerator to the floor and we were not picking up much speed. In fact, my foot started shaking on the accelerator when I realized how strong the inflow winds must have been to have kept the car from picking up much forward speed., The realization that the tornado may overtake us became even more clear. Finally, the car slowly began to pick up speed as the tornado crossed US Highway 60 directly behind us.

We got out ahead of the tornado by about one half of a mile and pulled over along the side of the road. We watched the tornado turn from a stout barrel shaped funnel into a half mile wide wedge in a matter of minutes (Picture on Page 4). We watched the tornado for about 10 minutes as it moved about 2 miles to our north. We then got into our vehicle and continued to stay with the large tornado as it tracked to the northeast . We were looking for some paved north/south road options in order to get closer to the tornado—but almost every road we passed was a wet and muddy dirt road.

"In fact, my foot started shaking on the accelerator when I realized how strong the inflow winds must have been to have kept the car from picking up much forward speed"

Finally, the tornado became rain wrapped north of Summerfield, TX.

During the Vortex-95 intercept this day, the P-3 Orion hurricane Hunter with an onboard radar gave the field command (hereafter FC) live Doppler Radar from flying around the storms that day. The FC notified the Armada about another storm developing just south of our position. We watched this storm for a while as it moved northeast just south of Hereford, TX. The storm looked quite disorganized and more multi-cellular than supercellular in structure. Suddenly, the FC told us that a storm about 10 miles southwest of Dimmitt, TX showed rapid intensification. This was the new storm the Vortex Armada would now target. We drove south on US Highway 385 from Hereford to Dimmitt, TX. Once we got south of Dimmitt we could see the storm to our south-southwest. The storm looked like a flared bell shape tower with striations through the middle. Some chasers and spotters call this type of storm updraft a barberpoll, since the striation form a helix around the updraft. Usually, observing striation on a storm's updraft is an indication that the storm's updraft is rotating cyclonically (in the counter clockwise direction). As we approached the updraft, we could see a block shaped wall cloud on the southwest section of the updraft base. Once we were parallel to the center of the updraft and due west of the wall cloud, we could see moderate to strong rotation in the wall cloud in a cyclonic direction. Shortly after, a funnel formed. Then suddenly, there was a plume of dirt the rose from below. Immediately, we radioed the FC telling him that we had a tornado and gave him our GPS coordinates. The FC relayed the report to the National Weather Service in Amarillo. The tornado began to grow larger to our west. The supercell spawning the tornado was moving northeast and since we had to stay on the north side of the wall cloud to sample the Forward Flank



Storm Data Continued…

est city's center, their address, or an intersection near their home. Please be detailed when you speak with the NWS regarding the specifics of your location.

Next, your local NWS office will complete a storm damage survey (usually done the next day if necessary—most likely completed in tornado or possible tornado cases). Meteorologists use received Local Storm Reports as the foundation for where they head on these damage surveys.

Meteorologists then will often write-up a post-event analysis. This may include a summary of the environment that helped to produce the severe weather, radar depictions of the storms, damage pictures (received from EMs, spotters, or from those that went on the damage survey), and a plot of received severe weather reports. This information is then issued as a Public Information Statement (PNS) and is posted to the headline portion of the local website (www.weather.gov/topeka).

The Local Storm Reports are considered "official" once they have been entered into the national **Storm Data** database. **Storm Data** is the official publication of NOAA that documents significant weather phenomena across the United States. Such weather events may have caused loss of life, injuries, significant property damage, or significant impact to local travel or economics. **Storm Data** also reports rare, unusual, or extreme events, including those associated with severe thunderstorms, including hail larger than 0.75" in diameter, wind speeds greater than 57mph, and all tornadoes. Many other events from blizzards to drought to volcanic ash fall are also reported. The National Climatic Data Center (NCDC) is the official keeper of all **Storm Data** entries, and publisher of the monthly **Storm Data** record. Pictures can also be uploaded to the **Storm Data** database—similar to the ones on this page that were received after the May 1st/2nd severe weather event. Publications can be ordered at http://www7.ncdc.noaa.gov/IPS/SDPubs?action=getpublication, or queried for free at http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms.

These storm reports are then used by National Weather Service Offices across the nation as well as students and researchers across the world, in order to study the storms, their environments, and the weather patterns that produce the extreme weather event. As you can see, your report is a critical throughout the NWS and it's partners. Thank you!

Top Right: Half of a garage was destroyed by the tail end of an EF-0 tornado in northern Osage County May 2nd.
Middle Left: A home was demolished by an EF-2 tornado in southwestern Douglas County May 2nd.
Bottom Right: Hail up to the size of baseballs fell in Ottawa City May 2nd.

Recent Office Events by Warning Coordination Meteorologist Jennifer Stark

Living in Kansas means that we are all impacted by the weather. From snow and ice storms in the winter, to heat, flooding and severe weather in the spring and summer months. One of the most important functions of the National Weather Service office in Topeka, is providing severe weather awareness and preparedness information to the public. Employees of our office participate in a wide range of public outreach activities as a part of our mission to protect life and property. It is important that the public is aware of the watches, warnings and forecasts that we provide.

Storm spotter and weather safety training becomes the primary focus for public outreach during the early spring months. Meteorologists from the National Weather Service give these presentations at least once in each of the 23 counties that we serve in north central, northeast and east central Kansas. The presentations are free and open to the public. This year, we reached almost 3000 people through the 45 storm spotter and weather safety training presentations that we gave.

The National Weather Service also staffed booths for Kansas Day activities at the state capitol on January 29th and at Forbes Field in Topeka for the Kansas Air Tour on April 5th. We hosted a group of students from Williams Magnet School in Topeka for a tour and inside look at the National Weather Service. We have had several groups of scouts tour our office. On April 16th, we attended the Irwin Army Community Hospital summer safety fair on Fort Riley. An award was presented to the University of Kansas for 50 years of continuous weather observations.

"This year, we reached almost 3000 people through the 45 storm spotter and weather safety training presentation that we gave."

Science teachers frequently request that a meteorologist from the NWS office visit their class while the students are learning about weather. School visits are a fun way for meteorologists to bring our fascination with the weather into the classroom. In addition, we hope students take away a love of math and science, as ell as a wealth of weather safety information that they can practice at home.

DAPM Bill Newman presents an award to members of the KU faculty. Picture by Meteorologist in Charge Ken Harding.

Climate Review Continued…

produced hail up to one and a quarter inch on the 17th and 23rd. Several severe thunderstorms on the 25th also produced damaging straight line winds, and hail up to the size of golfballs. The first tornado of the year in the NWS-Topeka county warning area was recorded on this night as well. The EF-1 struck just south of the town of Jamestown (Cloud County). A prolific severe weather event also came to fruition just before press time. May 1st and 2nd proved to be the busiest period yet for the meteorologists at the NWS in Topeka. Discrete severe thunderstorms produced hail up to the size of baseballs during the evening hours. The storms then congealed into a bow echo that then raced across northeast Kansas and produced widespread wind damage. Two tornadoes also occurred on the leading edge of the bow echo, including one in southwestern Douglas County that was rated an EF-2, and one in northern Osage County, rated an EF-0. A full review of this severe weather event will be available in the next edition of the Topeka News—coming out in August, 2008.

La Nina conditions coming to an end? To view the latest El Nino/Southern Oscillation Diagnostic Discussion, visit http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.pdf

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June 2, 1995 Chase Continued…

boundary, we decided to head north and keep just ahead of the tornado. Once we knew that we were out of the path of the storm, we watched the large tornado pass about one mile south of our location, which was about 2 miles south of Dimmitt, TX (See Chase Route Map, Page 5). The tornado continued to move to the northeast, and passed about a mile to our east. It remained rather large as it passed our position (Pictures on this page). I was a bit worried about strong Rear Flank Downdraft (RFD) winds hitting our position as the tornado moved northeast of us. However, the winds remained very light in the proximity of the tornado.

We decided to head north into Dimmitt, TX. There, we saw the large tornado move due north, just east of the town, then move a bit northwest on the north side of Dimmitt. The tornado began to narrow a bit as it moved northwest. As the tornado started to drift slowly, with a westerly component it began to rope out. The once large tornado had shrunken to a thin rope appearance, and kept this appearance for the next several minutes to the north of Dimmitt, TX. Finally, the tornado dissipated under the occluded wall cloud. A new wall cloud was forming as the supercell's updraft redeveloped east of Dimmit. We headed east of Hwy 86, out of Dimmit. Once we got about a mile east of town we noticed that about a one third of a mile wide section of pavement was removed by the tornado. We drove over the dirt wondering how strong the winds were in the tornado in order to tear such a large section of pavement from the road. We finally caught up to the new wall cloud, and observed slow cyclonic rotation. The supercell thunderstorm began to weaken as we approach Tulia, TX. By this time the sun had set and the FC called off all operations for the day. The Vortex-95 Armada headed back to Norman, OK.

The Dimmit, TX tornado looking north. Still picture taken from a video shot by Meteorologist Bill Gargan.

The Dimmit, TX tornado. Still picture taken from a video shot by Meteorologist Bill Gargan.

Vortex-95 had a very successful day collecting surface, radar, and upper air data from the vicinity of two powerful supercell thunderstorms that spawned two violent tornadoes. A damage survey was conducted, and the Friona, TX tornado was rated as an F3 and the Dimmitt, TX tornado was rated an F2.