

TORNADO:

Terror and Survival



The Andover Tornado • April 26, 1991

*A Kansas Community's
Struggle to Recover*





Earle Evans caught the monstrous Andover tornado on videotape as it moved nearer the Golden Spur Mobile Home Park, where 13 people lost their lives.

The Tornado Outbreak of April 26

The April 26 Storm that Spawned the Andover Tornado Wreaked Havoc in Kansas

By Jon Davies and Connie White

On Saturday morning April 27, 1991, several thousand shell-shocked Wichita area residents opened their eyes and began trying to incorporate the horror of the day before into the rest of their lives. The bond they shared: they no longer had a home.

The damage along a nearly 50-mile trail left by a powerful tornado the day before was devastating and unbelievable. Sightseers by the thousands flocked to Wichita and Andover, a quiet town just east of Wichita. But, more importantly, volunteers came by the hundreds.

Thus, the process began of recovering from what has come to be known as the Andover tornado, one of the costliest and deadliest in recent U.S. history.

The Andover tornado was only one of 54 twisters that tore across the plains on April 26, 1991. But the Andover tornado, the second of three twisters spawned by the same storm cell, was the fiercest of the deadly storm system's progeny.

By day's end, 21 men, women and children lay dead in two states. The small Kansas community of Andover, population 4,047, suffered the most loss. Thirteen were killed. Eleven of them had resided in the Golden Spur Mobile Home Park. Four people perished in the Wichita area, northeast of Pawnee and Greenwich; one person died in rural Cowley County near Winfield; and another was killed in rural Elk County. Two deaths were reported in Oklahoma.

Homeless survivors numbered well over a thousand. Dollar estimates of property damage in Kansas alone were between \$150 million and \$200 million. In Sedgwick County, residential and commercial damage estimates topped \$30 million, according to county disaster officials. The estimate does not include damage to personal property, such as automobiles, which was estimated at more than \$10 million. In addition, McConnell Air Force Base sustained more than \$45 million in damage.

“He said, ‘We’re sitting at ground zero.’ ”

-- Jim Bortnick, a Wichita South High School instructor and track coach, recalling the words of meteorologist Jim O'Donnell, who advised the school to postpone a track meet scheduled for the afternoon of April 26.

The total damage in Butler County has been estimated at more than \$40 million by government and insurance industry officials. Of that total, Andover sustained more than \$30 million in damages.

While most of the damage occurred in the Wichita area, the storms also caused substantial damage in rural areas of the state. Cowley County sustained \$6 million in damages, according to Randall Duncan, the county's civil defense coordinator. Elk and Greenwood counties sustained \$1 million in damages. The state insurance commissioner's office estimated claims for all Kansas storms in 1991 would exceed \$350 million, nearly three times the record \$130 million paid last year.

But no value, of course, could be placed on lost memorabilia and destroyed family treasures.

THE TORNADO OUTBREAK of April 26 was similar in many ways to the one that occurred 13 months earlier on March 13, 1990, which included the devastating Hesston storm.

On both days, numerous tornadoes occurred in a north-south band through the central United States. Both outbreaks included several long-track, violent tornadoes. The three tornadoes of the Andover family were on the ground a total of 78 miles, while the five-member Hesston tornado group covered more than 100 miles. Both outbreaks were deadly.

On April 26, National Weather Service meteorologists recognized well in advance the strong potential for severe weather and tornadoes. A strong upper-level storm system moving onto the plains had been predicted for several days, and the National Severe Storms Forecast Center in Kansas City issued

tornado watches by early afternoon from eastern Nebraska through Kansas and northern Oklahoma.

Local meteorologists, too, were on top of things early. In fact, a Wichita South High School track coach credited meteorologist Jim O'Donnell of television station KAKE in Wichita with being on the mark, weatherwise, hours before the storm.

“A track meet was scheduled for that afternoon,” recalled Jim Bortnick, an instructor and boys' track coach at South High School. “I remember it was super humid and very hazy that day. Coming from tornado country myself, I was concerned about severe weather developing. It must have been around 12:45 p.m. when we called Jim O'Donnell to check on the weather forecast. He basically just told us not to have the meet. He said, ‘We're sitting at ground zero.’ ”

The track meet was canceled.

The thunderstorm that produced the Andover tornado began as a developing updraft and thundershower over northern Oklahoma between 3:30 and 4 p.m. As the young storm moved northeast across the border into Kansas, the main updraft began to rotate more strongly, and the storm produced its first tornado, which touched down in eastern Harper County and dissipated in Sumner County south of Conway Springs. This first offspring, which generated winds of less than 70 mph along its 16-mile path, left only minor structural damage in its passing. It was only a glimmering of what was to come.

As the rotating storm moved into Sedgwick County, another tornado formed rapidly 1 1/2 miles south-southeast of Clearwater at about 6 p.m., uprooting trees near the banks of the Ninnescah River. From there, the track of this second tornado,

Left: The Andover tornado approaches McConnell Air Force Base from the southwest. Middle: The tornado grinds through McConnell. The view is looking west from the east side of the base. Photos by Dan Studebaker.



identifiable by its narrow path width of approximately 100 yards that later broadened dramatically to nearly one-half mile, would lead northeast to Haysville, into south Wichita, through Andover, and on toward Towanda and El Dorado.

Between Clearwater and Haysville, several homes and buildings were damaged as winds in the young tornado increased to more than 150 mph. The narrow twister then slammed through the northwest side of Haysville, damaging homes and scattering debris. Alternating between the appearance of a stove-pipe funnel and an elephant trunk, the tornado crossed the Kansas Turnpike near 55th Street in south Wichita, then moved across a section of Oaklawn, all the while comet-like, trailing debris from the trees, the homes and anything else caught in its path.

Spinning across McConnell Air Force Base, the still narrow tornado crossed a runway just south of a line of B-1B bombers, leaving them unscathed, but proceeding to rip apart recreational facilities and the hospital situated on the east side of the base. Apartment buildings between Rock and Webb roads also were unroofed and heavily damaged.

At this point, the tornado underwent a transition as more of the rotating parent updraft circulation descended to low levels, widening and maturing the funnel on the ground. While winds had previously remained below 200 mph, the tornado's destructive reach grew to a width of more than 200 yards as it swept through the

Right: Looking southwest from near the intersection of Harry and Greenwich, Elizabeth Flory of Chanute captured the twister on film as it moved into the Greenwich and Pawnee area, where the first deaths occurred.

Greenwich Heights subdivision north of Pawnee Street, leveling several houses. Tornadoic winds topped the 200-mph mark here, where the first deaths occurred.

The tornado's propensity for violence continued to grow as it tore through homes in the Springdale subdivision just south of U.S. Highway 54. Still intensifying, the vortex crossed Highway 54 and moved across the county line, approaching Andover through an open field.

Widening to nearly one-half mile with maximum wind speeds of more than 250 mph, the massive twister, now a full-fledged multiple vortex tornado, flattened homes on the west edge of south Andover, often leaving behind only debris-strewn foundations. At its strongest stage, the tornado crossed Andover Road and carved a deadly path through the Golden Spur Mobile Home Park. Dirt, debris and condensation whirled around the outer edge of the funnel, a result of the suction vortices, or small but intense tornadoes imbedded in the larger circulation, that rotated about its perimeter. Exiting the mobile home park across a field, the tornado laid down an almost unbroken trail of debris extending in a straight line for nearly a quarter of a mile. The debris trail ended in twisted wreckage caught in



The four photographs, above and facing page, show the destruction wrought by the Andover tornado when it tore through the small town from which it took its name. The massive Andover tornado was one of three twisters spawned by the same storm cell that thundered through Sedgwick and Butler counties on April 26. Photos by Will Huxtable.



Dollar estimates of property damage in Kansas were between \$150 million and \$200 million. The total amount of damage in Butler County was estimated at more than \$40 million by government and insurance industry officials. In Sedgwick county, residential and commercial damage estimates topped \$30 million. Photos by Will Huxtable.

THE BIRTH OF A TORNADO

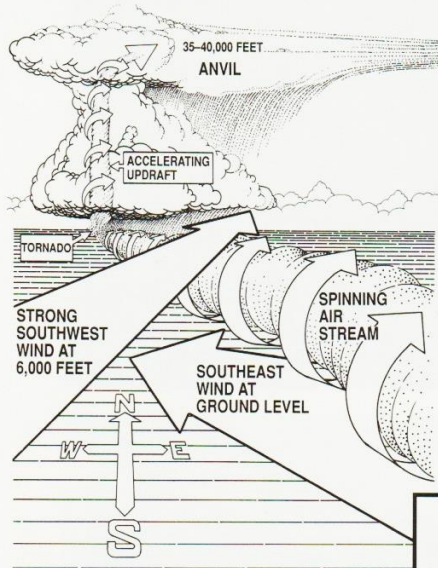


Illustration by Glen Feldman

FIGURE A: Illustrates the interaction of a thunderstorm updraft with veering winds as discussed in the text. Such interactions are necessary for the formation of a tornado.

INSET: Charts the vertical wind profile on April 26, 1991, at Topeka, where weather balloon observations are obtained twice daily. Topeka is the nearest such observation site to Andover. The winds at three different levels above ground are plotted as arrows. Each arrow indicates the direction of wind flow. The longer the arrow length, the stronger the wind speed. Starting with a south or southeast wind at the ground, winds strengthen and veer with height, becoming more westerly. This "spiral" profile of strong winds is ideal for producing "spin" in the atmosphere, a crucial element in tornado development.

THUNDERSTORMS OWE THEIR EXISTENCE TO RISING

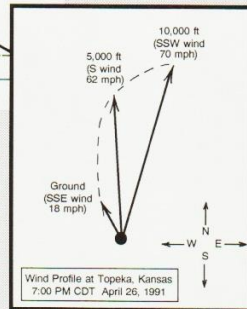
columns of air in an unstable environment, one that features much colder and drier air overlying moist warm air near the ground. Initiated and aided by processes such as the sun's heating, winds near the ground converging and forced lifting from a weather disturbance, some columns of buoyant air continue to rise a great distance. These processes create thunderstorms. If the air mass is unstable enough, some of the rising columns, or updrafts, within the thunderstorms can reach rapid upward speeds, sometimes 75 mph or more. Thunderstorms containing such updrafts are good candidates for producing tornadoes if the winds surrounding and feeding the updrafts are arranged in the proper vertical pattern or "profile."

The typical wind profile that can generate rotation in a thunderstorm updraft starts with a wind from the southeast at the ground. At higher altitudes, the wind moves gradually around to come from a more southwesterly or westerly direction and increases in speed. This pattern of "veering" winds with height can produce rotation, particularly if it is pronounced in roughly the first 6,000 to 10,000 feet above ground. Note that such rotation spins on a horizontal axis.

When a thunderstorm with a rapidly rising updraft encounters such horizontal spin, the spin can be tilted from a horizontal axis to a vertical one — as if the updraft were "ingesting" the spin. As a result, the updraft itself begins to rotate.

If the updraft is a strong and rapid one, the rotation is "stretched" and accelerated, similar to a skater spinning faster when pulling her arms in closer to her body. When the intense spinning and upward motion is concentrated into a narrow column, a tornado is likely to develop, descending to the ground from near the center of the updraft.

Yet, the birth of a tornado is a complex process, involving many other factors, some of which are still not fully understood by scientists. However, when thunderstorms are expected to form, weather forecasters watch both the wind profile and the atmospheric instability. The more favorable the wind profile for producing rotation



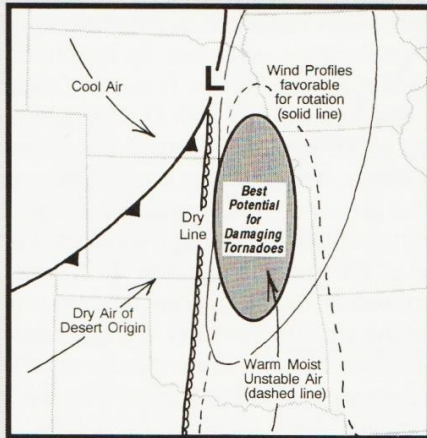


FIGURE B: Another key requirement in the development of a tornado is an unstable air mass, which promotes the rapidly rising updrafts necessary for the formation of a tornado. Above, the "tongue" of unstable air is enclosed by a dashed line, extending from Oklahoma into southeast Nebraska. The shaded area is where the extremely unstable air overlaps the favorable vertical wind profiles. This is where strong and violent tornadoes occurred the evening of April 26. Wichita and Andover were located in the middle of an area in which conditions were ripe for tornadoes.

and the more unstable the air mass, the more likely tornadoes are to develop. Strong winds high in the atmosphere are also important because they blow precipitation downwind of a thunderstorm updraft. That action precludes the possibility of large amounts of rain and hail falling directly into the updraft, which would diminish the rotating updraft's intensity.

Thunderstorms containing persistent rotating updrafts — called "supercell" thunderstorms by meteorologists — can often sustain themselves for hours, producing one tornado after another.

The tornado outbreak on April 26 involved numerous supercell thunderstorms that produced families of tornadoes from Nebraska to Oklahoma.

By Jon Davies

the branches of a tree row along Central Street.

The half-mile wide monster lumbered back across the turnpike and on toward Towanda, at times camouflaged by rain curtains that wrapped around its massive haunches. Several homes in the open country were devoured, but Towanda was spared as the north edge of the tornado passed less than 200 yards south of the high school on the southeast edge of town.

Entering an oil field east of Towanda, the tornado rolled a storage tank nearly a mile, showering oil in a dark, ragged line. A number of cattle were killed as the twister tracked across open fields northwest of El Dorado. But the tornado was weakening. Damage was spotty, and the tornado's track ended approximately five miles north of El Dorado.

Many tornadoes end in a narrow rope stage that dissolves or lifts back into storm clouds. The Andover tornado was different: Its massive funnel lifted as a large bowl shape and disappeared into the cloud base just west of the Kansas Turnpike.

Yet as the Andover tornado died in sunlight on the back edge of the thunderstorm, a new tornado roughly 100 yards wide formed east of the turnpike and touched down in El Dorado Lake, creating a cloud of churning spray. This newborn tornado moved north out of the lake and then along the turnpike, forcing motorists to abandon vehicles to seek shelter under overpasses. Several travelers were injured as cars and trucks were tossed about in the 100- to 150-mph winds.

This third tornado veered east of the turnpike, moving through the east edge of Cassoday, where it damaged an old school building and several houses. Lifting back into the sky northeast of Cassoday, it was last visible aloft as a thin, horizontal rope snaking into Chase County. While the rotating thunderstorm stayed intact to near Emporia, it had spent most of its energy, and produced no more tornadoes.

METEOROLOGISTS USED the Fujita Tornado Scale to assign maximum wind speeds to each of the three tornadoes in the Andover family.

The Fujita Tornado Scale

In the 1970s, meteorologists began to estimate tornado wind speeds based on the damage left behind, using a scale developed by Dr. Theodore Fujita of the University of Chicago. Because tornadoes vary considerably in intensity, with maximum wind speeds covering a range from less than 50 mph to more than 300 mph, this scale, although largely subjective in nature, provides a useful method of rating tornado intensities for documentation and comparison. The six tornado damage and wind speed categories range from weak, F0, to devastating, F5.

The first tornado of the Andover family was weak and rated F0. The violent second tornado, which struck Haysville, southeast Wichita and Andover, was rated F5 in Andover, F4 in the Greenwich Heights subdivision and F2 or F3 at most other locations along its path. The third tornado of the family was rated F2.

- **(F0) Gale tornado (40-72 mph):** Light damage. Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.
- **(F1) Moderate tornado (73-112 mph):** Moderate damage. Lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off roads.
- **(F2) Significant tornado (113-157 mph):** Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light-object missiles generated.
- **(F3) Severe tornado (158-206 mph):** Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off ground and thrown.
- **(F4) Devastating tornado (207-260 mph):** Devastating damage. Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
- **(F5) Incredible tornado (261-318 mph):** Incredible damage. Strong frame houses lifted off foundations and carried considerable distance to disintegrate; automobile-sized missiles hurled in excess of 100 mph; trees debarked; incredible phenomena will occur.
- **(F6 - F12) (319 mph to Mach 1, the speed of sound):** The maximum wind speeds of tornadoes are not expected to reach the F6 wind speeds.

(F0 + F1) Weak Tornado
(F2 + F3) Strong Tornado
(F4 + F5) Violent Tornado

By Jon Davies

Fujita Tornado Scale from J. Atmos. Sci., August 1981, p. 1517-1519.

The Andover tornado was rated F5 in intensity, with winds estimated to have exceeded 261 mph. This decision was made by Brian Smith of the National Severe Storms Forecast Center. Smith, who has worked with Dr. Theodore Fujita on many aerial surveys of tornadoes across the United States, conducted an aerial survey several days after the Andover tornado, but found it difficult to estimate maximum wind speeds because of the progress of clean-up efforts.

Fortunately, detailed aerial photographs taken the morning after the storm by Wichita photographer Paul Bowen were discovered several weeks later and shown to Smith in Kansas City. Several photos showed home foundations on the west edge of Andover blown nearly clean of debris, an indication of F5 wind speeds. The damage appeared to be at least as intense and certainly more widespread than that documented on March 13, 1990, in the town of Hesston. The Hesston tornado was rated F5.

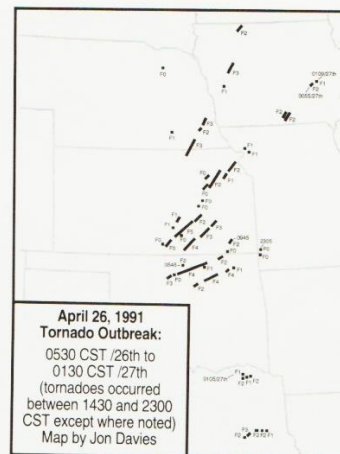
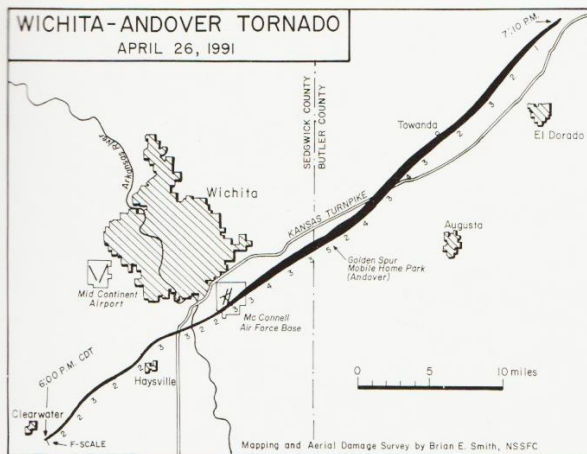
The first tornado of the Andover family was weak and rated F0. It had a path length of not more than 16 miles. The violent second tornado that struck Haysville, southeast Wichita and Andover was rated F5 in Andover, F4 in the Greenwich Heights subdivision and F2 or F3 at most other locations along its path of 46 miles. The third tornado of the family was rated F2.

The three tornadoes of the Andover family traveled 78 miles on the ground, leaving tons of wreckage in their wakes.

BUT SCIENTIFIC ANALYSIS came later. The night of the storm, individuals were faced with more pressing concerns. Medical attention, food, clothing and emergency shelter were the most immediate needs.

Waves of emergency personnel and search-and-rescue workers rushed in to help. Disaster relief workers, volunteers, journalists and broadcasters from far and near poured in to hard-hit Andover. Soon, politicians came to view the destruction.

U.S. Sen. Bob Dole arrived in Wichita on Monday, April 29, to assess the damage. Dole — along



Far left:
The map charts
the path of the
Andover
tornado.

Right: The chart illustrates the tracks of the 54 tornadoes of the April 26 outbreak. This tornado outbreak was similar to the one that occurred 13 months earlier on March 13, 1990, and included the devastating Hesston storm. Both outbreaks included several long-track, deadly tornadoes.

with his wife, Elizabeth, the president of the American Red Cross — briefly toured storm-damaged McConnell Air Force Base before viewing the devastation in Andover. That same day, President Bush signed a disaster declaration that made thousands of Segwick and Butler county tornado survivors eligible for temporary housing grants and low-interest loans to rebuild homes and businesses.

Six months after the storm, Dole recalled some of the images he had seen and some of the feelings he experienced while touring Andover and other tornado-ravaged communities.

“Like most Kansans, I’ve seen tornado damage before, but the April 26th tornadoes left a path of destruction that was almost unbelievable,” Dole said. “I will never forget my first view of the tragic destruction in Andover, especially seeing the pile of rubble that was once the town’s mobile home community. I was touched by the gritty determination of the people there, digging out, coming back and staying strong.

“I’ll also remember touring several blocks of homes wiped out all the way to the foundations, where neighbors were helping neighbors pick through the debris. And as I looked around, you couldn’t help but get a lump in your throat when you noticed that American flags were flying on top of

the rubble heaps, flags in honor of our troops in the Persian Gulf War. Even in the face of personal tragedy and devastation, Kansans still took the time to remember the brave Americans who were so far from home, laying their lives on the line for freedom. It was a powerful vision of what makes Kansas so special.”

Dole added, “When I returned to Washington that night, I phoned President Bush at Camp David to give him my first-hand account of the devastation. It was comforting the following day when the President went out of his way at his church to express his sorrow and say a prayer for the victims and their families.”

In the stressful days and weeks that followed, many prayed for strength and understanding. Faced with the stark task of picking up and rebuilding not only the pieces of their communities, but also the patterns of their shattered lives, the survivors discovered — at times painfully and sometimes slowly — that they were up to it. They carried on.

In Andover, exactly six months after the tornado tore through town — on a chilly, damp, overcast October day — volunteers planted more than 200 trees along the path of the deadly tornado. The project was organized by the people of Trees for Andover, a non-profit organization formed by local citizens to raise money to replace the 1,058 trees



Above: *The Andover tornado crosses the Kansas Turnpike half a mile south of the south Wichita toll booth. Photo by Jon Davies. Right: The Andover tornado dissipates west of the Kansas Turnpike, northwest of El Dorado.*



destroyed in the community during the storm. Jerry Stanyer, the director, explained that the on-going project would culminate in a final planting day held on April 25, 1992, just prior to the one-year anniversary of the tragedy.

During the drizzly October afternoon of the first planting day — after the volunteer tree-planters had packed up their shovels, brushed the dirt from their hands and stepped back to take a look at the new, small trees dotting the landscape — volunteers came together with other Andover citizens to dedicate a memorial to those who lost their lives in the storm. Constructed under the direction of Andover Senior Scout Nathan Frazier, the memorial stands in the Golden Spur Mobile Home Park. Its focal point is a simple, black plaque inscribed with these words:

Dedicated to the memory of those who lost their lives in the tornado of April 26, 1991, and those who volunteered their services in the reconstruction effort.

“This memorial,” Stanyer said, “represents healing. To our community, it represents regeneration.” □



Middle: *The third tornado of the Andover family dissipates near the Chase/Butler county line after striking Cassoday. Photos by Jon Davies. Bottom: Four Andover Boy Scouts help plant trees in the Golden Spur Mobile Home Park.*