

CHAPTER THREE
SECTION 3.8
HAZARD PROFILE-HIGH WINDS

AFFECTED JURISDICTIONS

COMMUNITIES

Unincorporated Pottawatomie County

Town of Asher

Town of Bethel Acres

Town of Brooksville

Town of Earlsboro

Town of Johnson

City of Maud

Town of Macomb

City of McLoud

Town of Pink

City of Shawnee

Town of St. Louis

City of Tecumseh

Town of Tribbey

Town of Wanette

PUBLIC SCHOOL DISTRICTS

Asher Public Schools

Bethel Public Schools

Dale Public Schools

Earlsboro Public Schools

Grove School

Macomb Public Schools

Maud Public Schools

Macomb Public Schools

McLoud Public Schools

North Rock Creek School

Shawnee Public Schools

South Rock Creek School

Tecumseh Public Schools

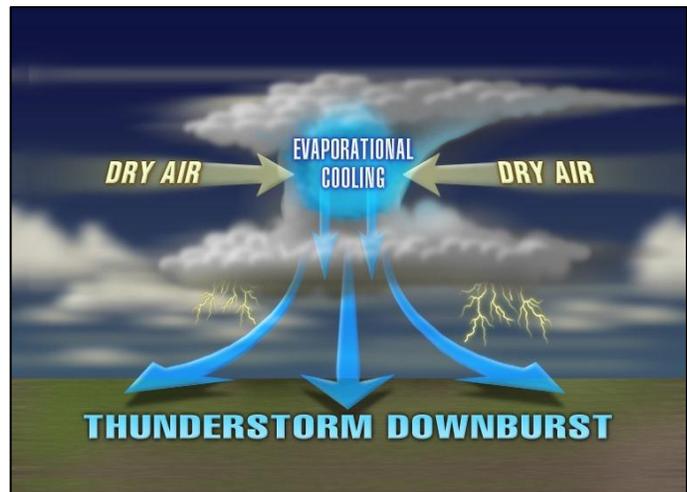
TECHNOLOGY CENTERS

Gordon Cooper Technology Center

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HIGH WINDS

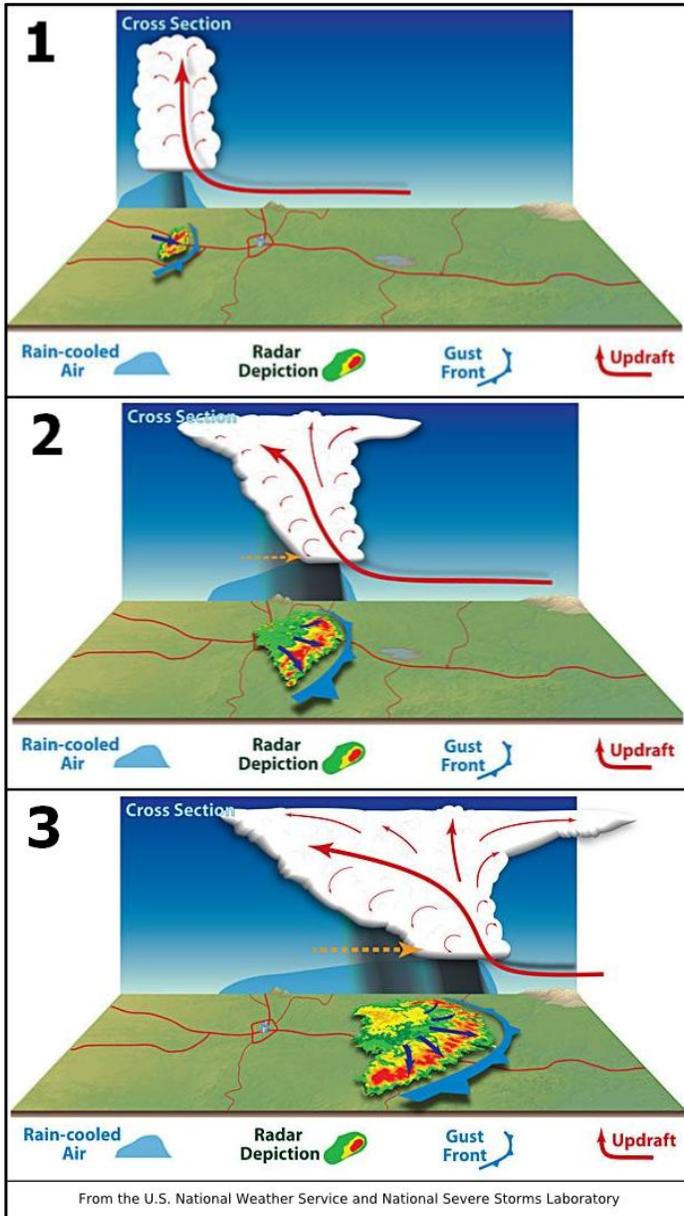
High winds are a common feature of thunderstorms, particularly severe thunderstorms. But damaging straight line winds can and have occurred outside of thunderstorms in Oklahoma. The National Weather Service uses winds in excess of 58 mph as one of the measurements in determining a thunderstorm to be severe. Wind is defined as the motion of air



relative to the earth's surface. High winds can result from thunderstorm inflow and outflow, or downburst winds when the storm collapses, and can result from strong frontal systems, or gradient winds (high or low pressure systems) moving across Oklahoma. "High winds" are wind speeds reaching 50 mph or greater, either sustained or gusting.

Damage similar to that caused by tornados and other cyclonic windstorms can result from downburst winds. Downbursts are powerful downdrafts associated with thunderstorms. Downbursts often occur when a thunderstorm is collapsing causing substantial damage almost equivalent to a small tornado. Downbursts can occur anywhere convective weather conditions happen. Observations suggest that approximately five percent of all thunderstorms produce a microburst and significant wind damage can be related to them. Downdrafts are typically only a few hundred to a few thousand feet across.





When the downdraft reaches the ground, it spreads out horizontally and may form one or more horizontal vortex rings around the downdraft. The outflow is typically 6-12 thousand feet across and the vortex ring may rise two thousand feet above the ground. Either can do severe damage to structures and cause significant injuries and even fatalities.



LOCATION

All participating jurisdictions, school districts, Gordon Cooper Technology Center and the unincorporated area of Pottawatomie County (Refer to Table 1-1) experience high winds and occasional downbursts during some thunderstorms exposing virtually all structures, infrastructure, and individuals in the county to their effects. The communities in Pottawatomie County experience an average of 50 thunderstorm days annually (Oklahoma

Climatological Survey) some of which will have high wind warnings issued during the event. Situated southeast of the Rocky Mountains and their cool air; north of the moisture-rich Gulf of Mexico; and northeast of the arid Southwest with its dry, hot air, thunderstorms producing high winds are common in Oklahoma and Pottawatomie County.

EXTENT

Officials in Pottawatomie County all participating jurisdictions, school districts and Gordon Cooper Technology Center consider high wind a threat if the winds exceed 58 mph. Winds in excess of 58 mph can cause damage to structures and disrupt power service.

The Beaufort Wind Scale is a system of estimating and reporting wind speeds. Its basis is the Beaufort Force composed of wind speeds, classification, from the World Meteorologists Organization (WMO), and descriptions of the visible effects of wind on land and water. Pottawatomie County considers winds higher than a Force 9 on the Beaufort scale as major and warrants high wind precautions. Anything less is considered minor.

Table 3-22 BEAUFORT WIND SCALE FOR LAND				
No.	Knots	MPH	Description	Effects on Land
0	0	0 MPH	Calm	Smoke rises vertically.
1	1-3	1-	Light	Smoke drifts in the wind.
2	4-6	4-	Light Breeze	Leaves rustle. Wind felt on face.
3	7-10	8-	Gentle Breeze	Small twigs in constant motion. Light flags extended.
4	11-16	13-18 MPH	Moderate Wind	Dust, leaves and loose paper lifted. Small branches move.
5	17-21	19-24 MPH	Fresh Wind	Small trees sway.
6	22-27	25-31 MPH	Strong Wind	Large branches move. Whistling in phone wires. Difficult to use umbrellas.
7	28-33	32-38 MPH	Very Strong Wind	Whole trees in motion

Table 3-22 BEAUFORT WIND SCALE FOR LAND				
No.	Knots	MPH	Description	Effects on Land
8	34-40	39-46 MPH		Twigs break off trees. Difficult to walk.
9	41-47	47-54 MPH	Severe Gale	Chimney pots and slates removed.
10	48-55	55-63 MPH	Storm	Trees uprooted. Structural damage.
11	56-63	64-72 MPH	Severe Storm	Widespread damage.
12	63+	73 MPH	Hurricane Force	Widespread damage. Very rarely experienced on land.

PREVIOUS OCCURRENCES

Hundreds of thunderstorms move across Oklahoma each year, with most bringing welcome precipitation. However, high winds accompanying thunderstorms are occasionally responsible for injuries, fatalities, and property damage. Following are the effects of thunderstorm winds that caused structural damage in Pottawatomie County.



Table 3-18 POTTAWATOMIE COUNTY HIGH WIND EVENTS 2006-2013 Data provided by the National Climatic Data Center (NCDC)		
Date	Location	Description
NOTE: Only wind storms resulting in structural damage are listed.		
08 Aug 2012	Macomb	61 knots - A weak surface trough existed over Oklahoma, and afternoon pulse storms resulted in a few wind damage reports. Roof shingles were blown off a house. Estimated damages: 2000.00

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2006-2013
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Center (NCDC)**

Date	Location	Description
NOTE: Only wind storms resulting in structural damage are listed.		
13 July 2011	Tribbey	61 knots -Strong winds were the main threats with the thunderstorms, with a few areas reporting minor wind damage. The storms moved off to the east and weakened with the loss of daytime heating. A roof was blown off a barn and several large trees were blown over. Estimated damages were \$9,000.
13 May 2010	Pottawatomie County	56 knots - The storms evolved into a squall line that brought numerous reports of severe weather, including particularly damaging winds and hail. Several power lines and a tree were downed by the strong winds. Estimated damage \$4,000.00
10 May 2010	Wanette	60 knots - A significant outbreak of severe thunderstorms and tornadoes affected a large part of northern, central, and southern Oklahoma. Roof damage was reported to a business just north of Wanette near the intersection of State Highway 39 and State Highway 102. No damage estimate available.
8 July 2009	Tecumseh	61 knots - Thunderstorms developed during the early morning hours ahead of an outflow boundary that was produced by thunderstorms in southwest Kansas. A pre-existing outflow boundary was already in place over northern Oklahoma, which aided in the development of precipitation through the afternoon hours. The thunderstorms were mainly confined to the area along and east of Interstate 35, with marginally severe hail and very strong winds reported as the cluster of thunderstorms moved southeast. Wind damage was reported over southeast Oklahoma, with hail up to quarter-size reported farther north. High winds downed power lines, utility poles and several trees. A sign from a local convenience store was blown down onto State Highway 9. Most of the town was without power for a short time. Monetary damage estimates were unavailable.

**Table 3-18 POTTAWATOMIE COUNTY HIGH WIND EVENTS
2006-2013
Data provided by the National Climatic Data
Center (NCDC)**

Date	Location	Description
NOTE: Only wind storms resulting in structural damage are listed.		
7 Jun 2009	Shawnee, Tecumseh	<p>61 knots - Thunderstorms developed over northwest Oklahoma while other non-severe thunderstorms developed down the dry line into western Oklahoma. By mid-evening, the rapidly weakening thunderstorms moved into central and parts of southwest Oklahoma. Very strong winds were reported sporadically from Comanche into Pottawatomie counties due to the collapsing thunderstorms. Winds were measured as high as 71 mph, with damage reported in several communities. Sporadic tree damage was reported from Tecumseh, north to Highway 3. The most concentrated area of damage was between Highways 177 and 9a. Three foot-diameter tree limbs were downed, and some shingles were blown off of several rooftops. Monetary damage estimates were not available.</p>
10 Feb 2009	Tecumseh	<p>56 knots - Power lines were downed and roof damage was reported on Highways 9 and 270. In Tecumseh, Highway 9 was closed for a short time from Malone to Skaggs Streets due to power lines lying on the roadway. Some fencing was also damaged at this location. Monetary damage estimates were not available.</p>
5 Nov 2008	Shawnee	<p>56 knots - Numerous strong to severe thunderstorms developed ahead of a dry line, west of Interstate 35, and moved northeast into central and northern Oklahoma. The thunderstorms became severe and produced large hail and some damaging winds. Several areas reported hail covering ground a couple of inches deep. Two additional rounds of thunderstorms developed by nightfall, with some areas receiving large hail three to five separate times.</p>

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2006-2013
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Center (NCDC)**

Date	Location	Description
NOTE: Only wind storms resulting in structural damage are listed.		
5 Nov 2008	Shawnee	<p>Some of the hail reached over golf ball size, and this combined with strong winds caused fairly significant roof, window, and fence damage. A wind gust of 54 knots was measured at the intersection of Interstate 40 and Highway 102 South. In the Shawnee area, minor roof damage, mainly shingle damage to three structures, was reported as a result of the high winds. Estimated damage was \$10,000.00</p>
30 May 2007	Shawnee, Northern Pottawatomie Co.	<p>70 knots - A cold front approached Oklahoma from the northwest. Ahead of the cold front, rich moisture was in place with numerous outflow boundaries from early thunderstorms located over parts of the state. Thunderstorms developed over eastern Colorado and southwest Kansas and moved southeast through northwest Oklahoma. The low-level jet pumped even more moist air into thunderstorms, creating favorable wind shear for severe thunderstorms with hail, high winds, and flooding rains. Wind gusts near 60 mph were reported over parts of central Oklahoma, with some damage reported due to the high winds. Wind gusts near 60 mph were reported over parts of central Oklahoma, with some damage reported due to the high winds. Several power lines and tree limbs were downed in Tecumseh. The roof was blown off of a building at Gordon Cooper Vo-Tech. Trees were also downed over Firelake Golf Course and numerous large limbs were snapped. At least one power pole was snapped. Six tribal buildings sustained minor damage, including the Citizen Pottawatomie Cultural Heritage Center. A door and the air conditioning unit were damaged at the Unity Health Center. Seven homes sustained minor damage, with a tree falling on one of the houses and a board was blown through a wind shield of a moving vehicle. Estimated damages: \$207,000.</p>

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Center (NCDC)**

Date	Location	Description
NOTE: Only wind storms resulting in structural damage are listed.		
15 Aug 2006	Shawnee	61 knots - Several trees were uprooted or damaged. Damage also occurred at an industrial park. Several semi-trucks were rolled over. One semi was destroyed when it rolled into a truck wash. The walls of the truck wash collapsed. The doors and roof to a steel building were also damaged. Estimated damage: \$50,000.00.
03 Aug 2006	Shawnee	56 knots - Many trees were downed on the north side of town, near Interstate 40 and Highway 77. Numerous tree limbs, up to 8 inches in diameter, were also downed across town. A chain link fence was downed. An outbuilding was blown over. A movie theater sign was also splintered. Estimated damage: \$25,000.00
21 Jul 2006	Maud, Tribbey,	56 knots - Power lines were downed. The roof of a car wash was also blown off. Estimated damages: \$20,000.00
4 Jul 2005	Shawnee	56 knots - Trees and power lines were downed. The ceiling fell in at the Shawnee Care Center. A nursing home in McLoud was also damaged. Estimated damages: \$13,000.00

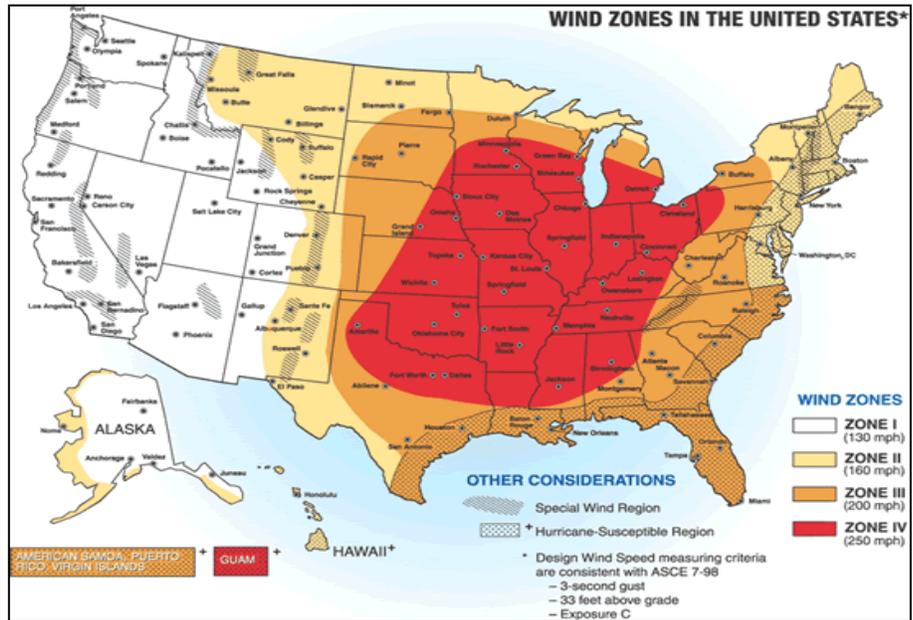
PROBABILITY OF FUTURE EVENTS

Pottawatomie County will continue to have thunderstorms with high winds, some being severe. There will continue to be damage from thunderstorm high winds and the possibility of downbursts. Considering the high winds experienced in the past, members of the PCHMPT believe that the probability of high winds in Pottawatomie County including all participating jurisdictions, school districts and Gordon Cooper Technology Center is “ **HIGHLY LIKELY**”.

Thunderstorm winds have been responsible for causing wind damage to structures and vehicles. High winds can cause death or injury to humans when buildings collapse, turn over or have trees or power poles fall on them by winds exceeding 58 miles per hour.

VULNERABILITY AND IMPACT

Mobile homes are often negatively affected by wind of these speeds. Damage to weaker structures can occur with lesser winds. Wind damaged crops can create hardships for farmer/ranchers who experience financial loss. Economic losses occur to communities if winds



cause damage to businesses by loss of business. Homes that are damaged during high wind events may be uninhabitable and the occupants must relocate either to relatives, friends' homes or temporary shelters.

Other damages can occur including downed trees or power poles blocking traffic lanes as well as the accompanying power outages causing loss of power to critical facilities and the general population. This can have especially serious consequences during extreme temperature periods. Power poles and trees downed by winds block roadways



causing travelers to alternate routes. Schools and businesses experiencing



long-term power outages usually have to close temporarily until power is restored. School bus routes may be blocked by downed power poles or trees across the roadway, requiring additional time to find an alternate route. Emergency vehicles are also often blocked by debris and must find alternate routes, costing precious time.

CONCLUSION

Oklahoma and the communities in Pottawatomie County have significant exposure to high wind events. Infrastructure damage most often occurs to transmissions lines and communications facilities; however, occasional damage to structures can arise during downbursts. Unfortunately, early warning for downburst is limited due to the speed in which they develop, although research is ongoing through the National Weather Service (NWS) to increase warning information for the public.



SOURCES

Local Emergency Management Records

National Weather Service (NWS)

www.srh.noaa.gov/oun/

National Climatic Data Center (NCDC)

www.ncdc.noaa.gov/stormevents/

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