

CHAPTER THREE
SECTION 3.12
HAZARD PROFILE-SEVERE WINTER WEATHER

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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SEVERE WINTER WEATHER

Severe winter weather, or a winter storm, is an event in which the dominant varieties of precipitation are forms that only occur at cold temperatures, such as snow or sleet, or a rainstorm where ground temperatures are cold enough to allow ice to form. A winter storm can range from moderate snow over a few hours to blizzard conditions with high winds, or can be freezing rain or sleet, heavy snowfall with blinding wind-driven snow and extremely cold temperatures that last several days. Winter storms vary in size from affecting several states to affecting only a small part of a single state.



Flurries are snow events with light snow falling for short durations. No accumulation or only a light dusting is all that is expected with little or no effect on the population of the state.

Severe Winter Storm is one that drops four or more inches of snow during a 12-hour period, or six or more inches during a 24-hour span.

Winter Storm is a term that refers to a combination of winter precipitation, including snow, sleet, freezing rain, etc...

Blowing Snow is wind-driven snow that reduces visibility and causes significant drifting. Blowing snow may be snow that is falling and/or loose snow on the ground and picked up by the wind.

Ice Storms occur when freezing rain or sleet falls and freezes immediately on impact.

Freezing Rain is rain that falls onto a surface with a temperature below freezing. This causes it to freeze to surfaces, such as trees, cars, and roads, forming a coating or glaze of ice. Even small accumulations of ice can cause a significant hazard.



Sleet is rain drops that freeze into ice pellets before reaching the ground. Sleet usually bounces when hitting a surface and does not stick to objects. However, it can accumulate like snow and cause a hazard to motorists.

Wind Chill is used to describe the relative discomfort and danger to people from the combination of cold temperatures and wind. The wind chill chart below from the National Weather Service shows the wind chill derived from both wind speed and temperature.

LOCATION

All participating jurisdictions, school districts and Gordon Cooper Technology Center, and the unincorporated area of Pottawatomie County and central Oklahoma have the potential for winter snow and ice storms. These events can be extremely paralyzing to communities in the county.



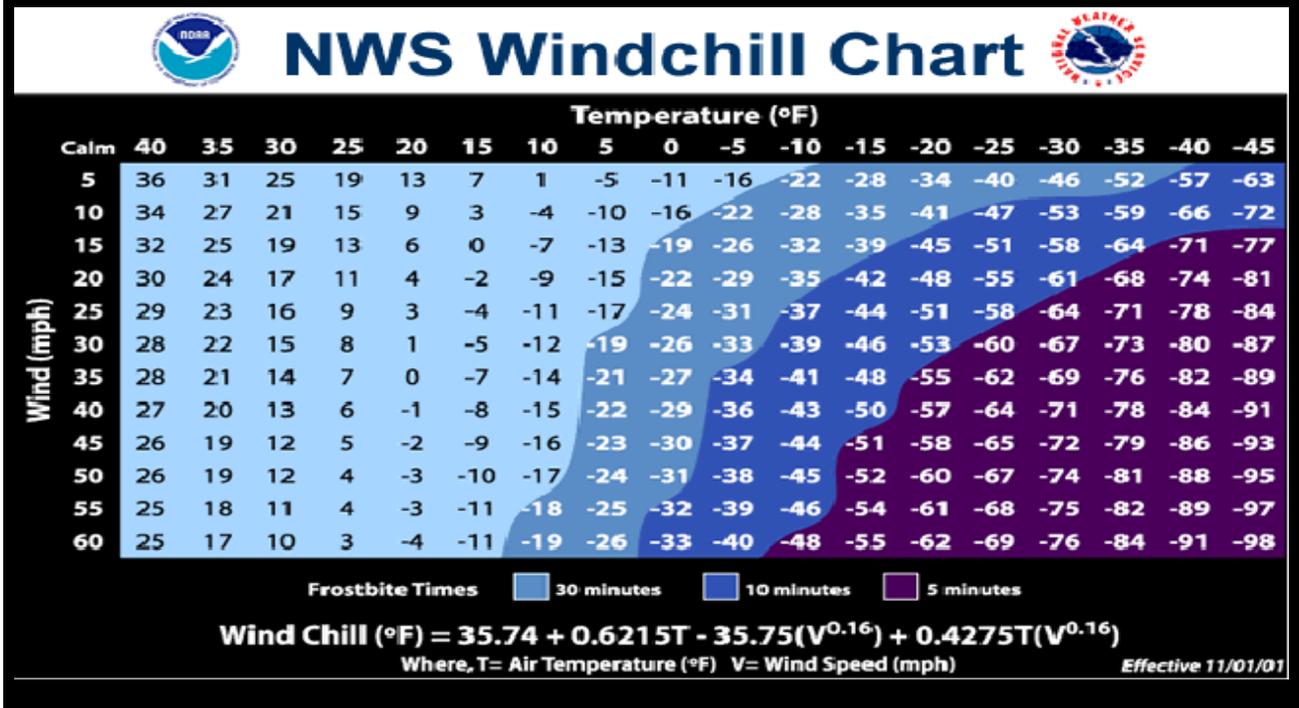
Even though the terrain is generally flat these events can still overwhelm the residents and their ability to travel to work, school, or other areas of the county. Along with affecting local activities, winter storms can have negative impact on Pottawatomie County as a main

transportation artery for central Oklahoma.

EXTENT

Table 3-30

NATIONAL WEATHER SERVICE WINDCHILL CHART

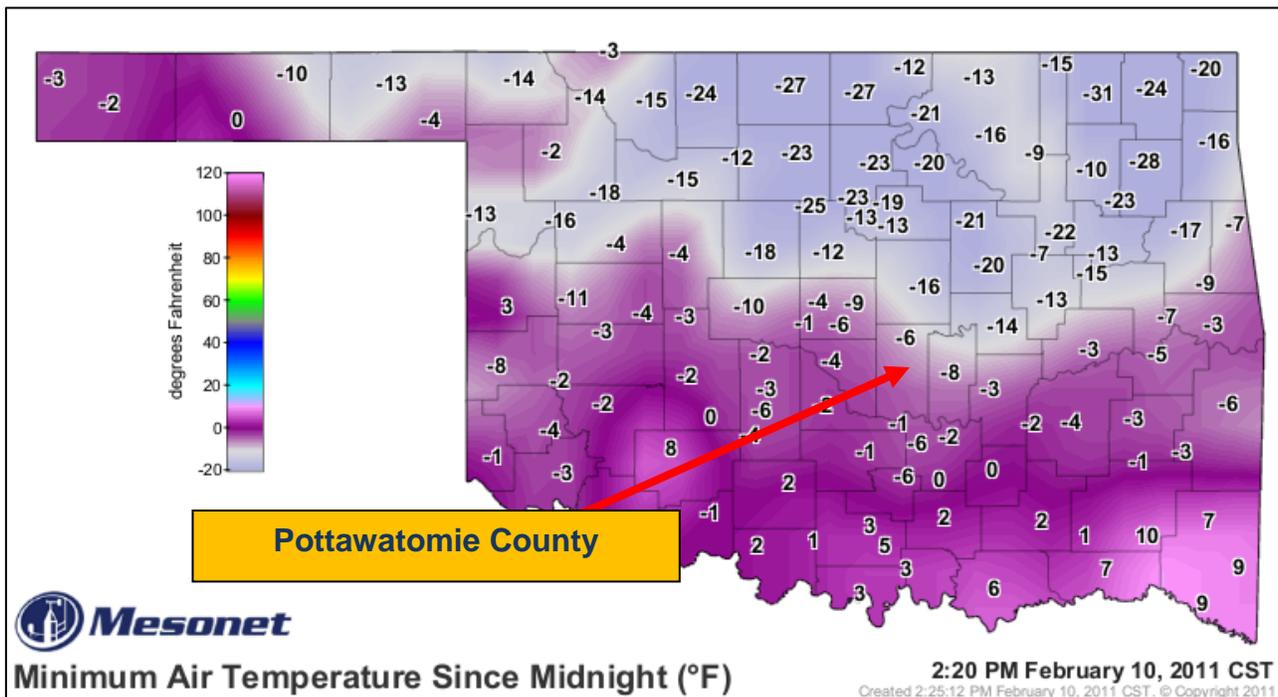


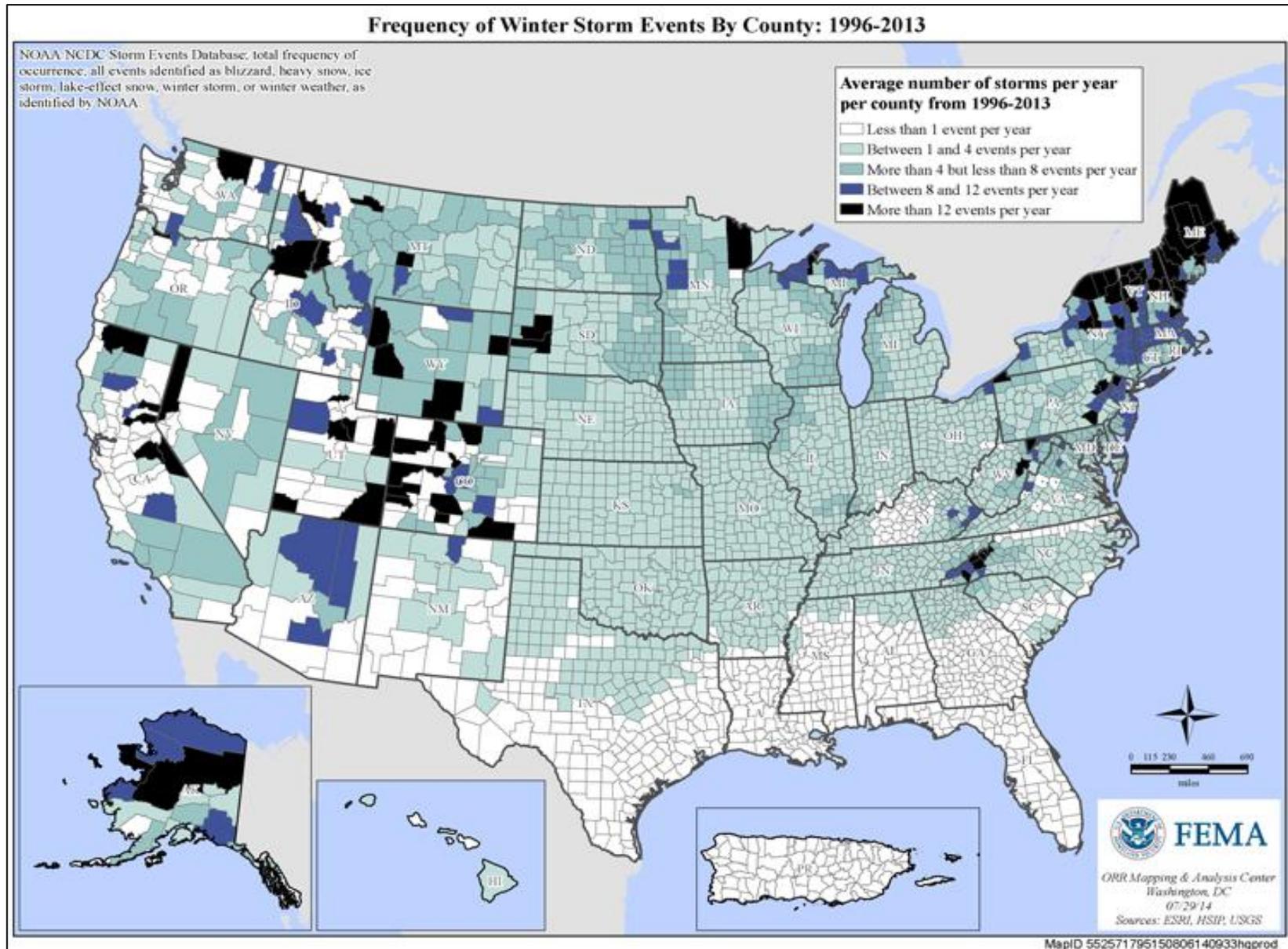
Heavy snow, sheets of ice, or sleet can immobilize Pottawatomie County and strand commuters, stopping the flow of supplies, and disrupting emergency services and interstate commerce traffic. In some instances, large accumulations of snow or ice can cause structural damage, collapsed building roofs, uproot trees, snap limbs, and sever power lines. The cost of snow removal, repairing damages, and the loss of business



negatively impacts the economy of the communities in Pottawatomie County. The cold, snow accumulation and the potential of ice all have a part in the effect of a winter storm. Wind chills have a devastating impact on the residents of Pottawatomie County during severe winter weather, as the temperatures can reach life threatening levels. Wind chill is the combination of wind and temperature that serves as an estimate of how cold it actually feels to exposed human skin. Pottawatomie County officials along with the officials in all participating jurisdictions, the school districts and Gordon Cooper Technology Center, consider wind chill values below -19 degrees with winds at 5 mph to be extremely dangerous to the population, although hypothermia can occur at warm temperatures and cause death to unprotected individuals.

The National Weather Service issues wind chill advisories when wind chills of 20 degrees to -39 degrees with winds greater than 10 mph are possible. In Pottawatomie County, minimum temperatures below 15 degrees with winds exceeding five miles per hour, as shown on the wind chill chart, bring local concerns regarding the potential harm to people and pets.





Snow and particularly ice often plague the area causing road closures and limited travel. Snow during winter storms in Pottawatomie County generally ranges from four to eight inches annually, although in February of 2011, over 9” of snow fell around Pottawatomie County with snow drifts measuring up to four feet due to winds exceeding 35 mph. Many businesses and schools were closed for a week as snow removal efforts were ongoing. Ice cover exceeding ½ inch or snow exceeding 3 inch cover is considered a major event for Pottawatomie County, participating jurisdictions, public schools, and Gordon Cooper Technology Center.

Table 3-31 THE SPERRY UTILITY ICE DAMAGE INDEX			
Ice Index	Radial Ice Amount (inches)	Wind (mph)	Damage and Impact Descriptions
1	< 0.25	15-25	Some localized utility interruption possible, typically lasting only 1 or 2 hours maximum.
	0.25-0.50	<15	
2	<0.25	>=25	Scattered utility interruptions expected, typically lasting less than 8-12 hours maximum.
	0.25-.50	15-25	
	.50-1.00	<15	
3	0.25-0.50	>=25	Numerous utility interruptions, with some damage to main feeder lines expected with outages lasting 1-3 days.
	0.50-0.75	15-25	
	0.75-1.00	<15	
4	0.50-0.75	>=25	Prolonged & widespread utility interruptions, with extensive damage to main distribution feeder lines and possibly some high voltage transmission lines. Outages expected to last more than 3 to 5 days.
	0.75-1.00	15-25	
	1.00-1.50	<15	
5	0.75-1.00	>=25	Catastrophic damage to entire utility systems. Outages could last from one week to several weeks in some areas.
	1.00-1.50	15-25	
	>1.50	>15	
<i>The Sperry-Piltz Utility Ice Damage Index. The categories are based upon combination of precipitation totals, temperature, and wind speed.</i>			

Light to heavy snow can immobilize an area and paralyze communities, strand commuters, stop the flow of supplies, and disrupt emergency services. More than half of the winters in Pottawatomie County have at least one inch of snow, with eight inches or more occurring less frequently.

Accumulations of snow, in rare instances, can collapse buildings and frequently topple trees and power lines. The cost of snow removal, repairing damages, and the loss of business negatively impacts the economy of the communities in Pottawatomie County. Pottawatomie County snow and ice events can cause



damage countywide and such damage has occurred in recent years. The **Sperry-Piltz Ice Damage Index** above illustrates damages that may be caused to utilities throughout the county. Ice accumulations of ½ inch are considered major due to traffic problems. Snow and ice frequent the area causing road closures and limited travel.

PREVIOUS OCCURRENCES



A series of major ice storms during the last decade have plagued Pottawatomie County and the State of Oklahoma. Ice storms with extended freezing rain events with heavy accumulations lasting from several hours to many days have also had significant impacts on Pottawatomie County over the last decade. The winters of 2000-2001,

2006-2007, and 2010-2011 each featured a major ice storm that deposited more than three inches of ice in 24 hours across much of Oklahoma including communities in Pottawatomie County. See Table 3-27 for historical winter storm occurrences.

**Table 3-27 POTTAWATOMIE COUNTY WINTER STORMS
2006-2013
Information provided by the National Climatic
Data Center (NCDC)**

Date	Location	Description
25-26 Feb 2013	Pottawatomie Co.	<p><u>Winter Weather</u> - A strong winter storm system moved from west Texas into southern Oklahoma overnight on the 24th and lasted through the morning hours of the 26th. Very heavy snowfall occurred to the north and west of the upper low, mainly over parts of northwest Oklahoma. As surface low pressure strengthened over southern Oklahoma, very strong and gusty northwest winds developed, leading to blizzard conditions for several hours over much of western Oklahoma. Up to 18 inches of snow fell over parts of northern and western Oklahoma, with lesser amounts from southwest through north central and central Oklahoma. The winter storm gradually moved east through the day on the 24th and slowly exited the region by the morning of the 26th. Most of the county saw little to no snow accumulation, but areas south of Shawnee picked up around an inch of snow once the storm had ended.</p>
8-9 Feb 2011	Pottawatomie Co.	<p><u>Winter Storm</u> - Two to four inches of snow was measured around Pottawatomie county, including three inches measured around Tecumseh and Shawnee. Numerous wind gusts over 25 mph were reported for several hours greatly reducing visibilities and causing considerable blowing and drifting of the snowfall.</p>
31 Jan - 3 Feb 2011	Pottawatomie Co.	<p><u>Winter Weather</u> - Thunder sleet, freezing rain, and snow began during the late evening, with wind gusts increasing to over 30 mph by midnight. Nine inches of snow was measured two miles northeast of Shawnee. Wind gusts over 45 mph also created considerable blowing and drifting of the snowfall, which reduced visibilities. The event began during the evening hours of 1/31. Estimated damages: \$119,752.52</p>

Table 3-27 POTTAWATOMIE COUNTY WINTER STORMS 2006-2013 Information provided by the National Climatic Data Center (NCDC)		
Date	Location	Description
28-30 Jan 2010	Pottawatomie Co.	Ice Storm - Due to severe winter storm on Jan 28-30, ice covered the streets. Roads were impassable. Motorists were stranded across northern areas of Pottawatomie County. Officials and responders coordinated search and rescue efforts, sheltering operations, and other emergency protective measures. Estimated damages: \$31,446.76
24-25 Dec 2009	Pottawatomie Co.	Winter Storm - Due to severe winter storm on Dec 24 & 25 with snowfall exceeding 14 inches the City of Shawnee pushed snow from designated snow routes. Travelers across Pottawatomie County were stranded due to the snowfall and rescue operations were coordinated throughout the county fire departments. Estimated damage: \$43,114.25
26-27 Jan 2009	Pottawatomie Co.	Winter Storm - A quarter of an inch of ice glaze accumulated, with an additional three inches of sleet on top of that was reported near Tecumseh. Travel around town was significantly hampered with several minor wrecks reported. Shawnee reported at least a half of an inch of sleet and ice glaze accumulation. Ten minor automobile accidents were reported with a few minor injuries. Monetary damages were not given.
12-14 Jan 2007	Pottawatomie Co.	Winter Storm - A strong winter storm crippled much of Oklahoma from January 12th through the 14th, spreading snow, freezing rain and sleet across the state. The freezing rain and sleet occurred mainly over central and southwest Oklahoma, with mainly freezing rain over the southeast. Also, the prolonged period of wintry precipitation closed airports, schools, malls, and other places of business. The slick and hazardous roads caused many schools to remain closed for several days after the winter precipitation had ended.

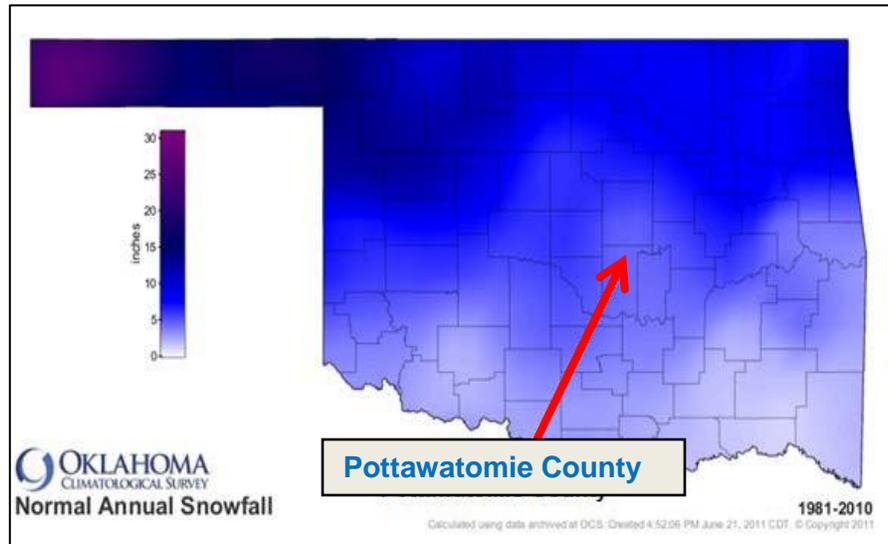
**Table 3-27 POTTAWATOMIE COUNTY WINTER STORMS
2006-2013
Information provided by the National Climatic
Data Center (NCDC)**

Date	Location	Description
9 – 11 Dec 2007	Pottawatomie Co.	<p><u>Ice Storm</u> - A devastating ice storm affected a large swath of Oklahoma beginning on the 9th and continuing through the 11th over parts of the area. The storm left behind a trail of severe damage to trees and power lines, which in turn led to the worst power outage in Oklahoma history (in terms of the number of people impacted). By the time the storm had ended, over one inch of ice had accumulated over a good portion of Oklahoma. The governor declared a State of Emergency for all 77 Oklahoma counties. At least 27 deaths were reported statewide, mainly due to hundreds of automobile accidents, although some were due to prolonged cold air exposure or carbon monoxide poisoning. Tree, power line and power pole damage was widespread statewide, which resulted in hundreds of thousands without power. Some of the trees that had to be cut back or cut down altogether were over 100 years old. At the peak of the event, more than 641,000 electric customers were without power (the actual number of people was likely much larger). Due to the magnitude of the outage, electrical crews from dozens of states worked 12-hour shifts daily to restore power. Even with the huge relief effort, more than 150,000 residents were still without power weeks later. Even city water and sewage plants were without power, making them unable to pump water for a short time. Christmas parades and area sporting events had to be rescheduled or cancelled all together.</p>

Table 3-27 POTTAWATOMIE COUNTY WINTER STORMS 2006-2013 Information provided by the National Climatic Data Center (NCDC)		
Date	Location	Description
9 – 11 Dec 2007	Pottawatomie Co.	Final Exams at area colleges were also postponed. The local economy took a huge hit as the ice storm hit during a key weekend for holiday sales. Widespread tree damage was reported across the county. Several utility poles caught fire due to the weight of the ice. One of half of the homes and business' were without power. Meeker, Tecumseh, and McCloud were also hit hard with power outages. Numerous traffic accidents occurred as a result of the ice accumulation.
29-30 Nov 2006	Pottawatomie Co.	Winter Storm - A strong cold front brought cold arctic air to the region. A strong upper level storm system then translated across the region over the arctic air causing winter precipitation. Winter precipitation fell in the form of freezing rain, sleet, and snow beginning on November 29 and ended during the evening of November 30. Thunderstorms also occurred with the sleet and freezing rain. Several inches of sleet fell across parts of central and southern Oklahoma. Ice glaze accumulations of up to 1/2 an inch were also reported across parts of central and southern Oklahoma. The winter precipitation caused hazardous travel across the area with numerous accidents reported.

PROBABILITY OF FUTURE EVENTS

The frequency of snow events relates to drought periods since during droughts little moisture is experienced whether rain or snow events. Locations in central Oklahoma, including Pottawatomie County, have gone several years between winter weather events.



Oklahoma's location between the cold winter temperatures of the Rocky Mountains and the moisture from the Gulf of Mexico gives Oklahoma the potential for further ice and snow events. Northwest Oklahoma receives more snow annually than communities in Pottawatomie County; however, heavy accumulations of ice and/or snow are still possible. In recent years, communities in Pottawatomie County have experienced more damage from ice storms than from snowfall.



The Oklahoma Climatological Survey map below shows Pottawatomie County in an area of the state that is subject to 3-6 inches of annual winter precipitation. The probability of Pottawatomie County including all participating jurisdictions, school districts and Gordon Cooper

Technology Center. experiencing winter weather is **“LIKELY”**.

VULNERABILITY AND IMPACT

Residents in Pottawatomie County have been plagued with a series of major ice and snowstorms during the last decade. Ice storms typically last several hours to days with heavy ice accumulations. The icy cover can down power lines and tree limbs, causing millions of dollars in damage to vehicles and structures, and producing widespread power outages. These events are extremely paralyzing to affected communities and citizen residing in Pottawatomie County.

WINTER CLIMATE

- Average Annual Snowfall: 7.5 inches
- Days with snow on ground: 2
- Greatest Seasonal Snowfall: 24.1 (1977-1978)
- Greatest Daily Snowfall: 14" (Pottawatomie Co., Dec 29, 1954) Last
- Freeze in spring: April 1
- First Freeze in autumn: November 3



Strong winds often accompany winter storms creating blizzard conditions with blinding wind-driven snow, severe drifting, and dangerously low wind chill temperatures. Strong winds with these intense storms can knock down trees, utility poles, and power lines. Heavy accumulations of ice also bring down trees, electrical wires, telephone poles

and lines, and communication towers. Most electric and telephone lines in Pottawatomie County are above ground which exposes them to winter weather.

Communications and power can be disrupted for days and weeks while utility companies work to repair the extensive damage. In extreme cases, especially those involving

elderly, handicapped, or very young, it is necessary to move them to shelters where they can stay until they return home. Even though shelters are provided after a few days, most make arrangements with friends or relatives in unaffected areas to stay with them. This is not only inconvenient but the temporary loss of population along with inaccessible roads for essential services causes critical economic shortages to businesses that are able to remain open.



Extreme cold often accompanies a winter storm. Prolonged exposure to the cold can cause frostbite or hypothermia and become life threatening. Infants and young children, elderly residents, and people who work outdoors are the most susceptible. Freezing temperatures can cause severe damage to crops and

other critical vegetation, and pipes may freeze and burst in homes and businesses. During power outages caused by icy wires, most furnaces and heating systems will not operate, adding more threats to citizens of Pottawatomie County.

Structure fires occur more frequently in the winter due to lack of proper safety precautions, and present a greater danger because water supplies may freeze and impede firefighting efforts. Icy roads may also hinder firefighting operations.

The leading cause of fatalities during winter storms is from automobile or other transportation accidents. Even small accumulations of ice may initiate extreme hazards to motorists and pedestrians. Heavy snow usually immobilizes transportation facilities and strands commuters and school buses, stops the flow of deliveries and supplies, and delays the response of emergency services. Many of



the roofs on school buildings expand large distances and a heavy snow load could cause the roof to collapse causing expensive repairs and loss of use for that facility. Schools in Pottawatomie County often close due to safety concerns for students coming to or leaving school. In the recent snowstorm of 2011, many schools were closed for over a week.

Accumulations of snow can collapse weaken buildings, and knock down trees and power lines. In rural areas of the county, homes and farms may be isolated for days, and unprotected livestock may die. The costs of snow removal, repairing damages, and loss of business can have large



economic impacts on communities in Pottawatomie County. The cost of running equipment not normally designed for snow removal can be costly to repair after snow removal; roads are often left with “potholes” requiring repairs; and business employees or owners are often unable to get to their place of business due to hazardous roads.

CONCLUSION

Pottawatomie County has an extensive history of winter storms and ice storms. These have ranged in severity from heavy snow to severe ice conditions. Winter storms have created numerous problems for residents and local government due to loss of work time and revenue, wear and tear on city equipment, and the additional expenses in recovery efforts from these events.

The continued threat of winter storms and ice storms has been a mitigating event in that it has prompted activities removing weakened tree branches and securing power lines to avoid power outages that could result in further destruction and fatalities from the storm. Future mitigation efforts should focus on keeping utility easements clear of vegetation in order to minimize the impact of future severe winter storms and on maintaining effective de-icing and snow clearing activities on roads in Pottawatomie County.



SOURCES

National Climatic Data Center (NCDC)

<http://www.ncdc.noaa.gov/stormevents/>

National Weather Service – Norman (NWS)

<http://www.srh.noaa.gov/oun/>

Oklahoma Climatological Survey (OCS)

<http://climate.mesonet.org/>

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