Hazardous Weather Annex

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Generic Information

With the potential threat of a severe weather event, Warren County Emergency Services would use severe weather email address book as well as Highway Superintendent list and Fire Chiefs/EMS Captains' lists. Public education is ongoing, through the Warren County website, social media and community presentations. During the response phase, we will encourage dialogue during an incident on social media to keep everyone informed. Warren County annually at minimum hosts a weather spotter training for the National Weather Service and these spotters are activated during storms. The hazards listed here are weather related disasters that are in order from highest rating hazard to lowest.

Flooding

A flood occurs when prolonged rainfall over several days, intense rainfall over a short period of time, or an ice or debris jam causes a river or stream to overflow and flood the surrounding area. Melting snow can combine with rain in the winter and early spring; severe thunderstorms can bring heavy rain in the spring and summer; or tropical cyclones can bring intense rainfall to the coastal and inland states in the summer and fall. Flash floods occur within six hours of a rain event, or after a dam or levee failure, or following a sudden release of water held by an ice or debris jam, and flash floods can catch people unprepared. You will not always have a warning that these deadly, sudden floods are coming. Before a flooding event occurs, the public would be warned of the potential threat. During the response, they highway department and public would obtain pictures. During a flooding event, Warren County Emergency Services would be in regular communications with the National Weather Service.

Before and during a flood, resources will be allocated toward public safety, timely public information and warning on flood potential. Monitoring flood potential and initiating flood mitigation measures to protect public facilities, streets, roads and bridges. Monitoring ice jams and providing public warning to downstream property owners.

Ice Storm

With the potential ice storm, the National Weather Service would alert of warmer weather coming. The possibility of more snow would have a negative impact and people need to be aware of potential collapse from the weight of ice and snow.

Wildfire

The State Department of Environmental Conservation (DEC) will provide assistance at no cost to the jurisdiction when a wild land fire in its jurisdiction is beyond the capability to control. Any agency may take initial action on a wild land fire while notification is being made to the agency with jurisdiction. Assisting agencies must meet the minimum qualifications and certifications set by the agency with jurisdiction. Radio communications will be on regular agency frequencies unless more than one agency is involved then the State Fire Mutual Aid frequency should be utilized.

During the wild land fire season, federal, state and local fire agencies can establish a committee to review fire dangers, prevention programs, public information and mutual cooperation procedures.

Ice Jam

With the possibility of an ice jam release or flooding upstream due to an ice jam, those who live in the pre-determined areas would be notified via HyperReach. Ice tends to float because it is lighter than water, and when it is put under pressure it will often break into huge slabs. These large slabs of ice will then move downstream until they run into an obstruction along the river such as an island, a bend, or a shallow portion of the stream. When this occurs, the ice will often slow down or even stop, causing a back up to occur or an ice jam. When the ice dams up the flow of the river, the water behind it still has to go somewhere so it will begin to overflow the banks of the river. This often occurs rather quickly, sometimes in less than an hour as the water tries to get around the ice. In addition, as the water continues to rise behind the ice jam, the rising pressure can release the jam and release a sudden surge of water and ice down the river causing additional flooding downstream.

Winter Storm

Winter weather and high wind events are generally larger scale events with some additional lead time and may involve the entire county. Winter storms can occur October through April. Heavy snowfall totals disrupt transportation, communications and complicate emergency response. Almost every winter there is a severe winter storm and blizzards are probable. The first winter storm of the season typically tends to have more motor vehicle incidents. Preparations for the event should begin and may include the following, depending on the type of event:

- Modification of work schedules to ensure adequate staffing levels throughout the event.
- Vehicle and equipment preparations to allow for rapid and sustained deployment.
- Supply purchases needed to sustain operations throughout the event

Earthquake

Earthquakes happen with no warning. Ground shaking may cause sloughing of water in lakes or bays. It may trigger the failure of structures and/or create landslides. The major form of damage from most earthquakes is damage to construction. Bridges are particularly vulnerable to collapse. Dam failure may generate downstream flooding.

Tornado

Tornadoes typically occur with little warnings. Tornado warnings are generally issued for specific locations, as outlined in the warning. These warnings indicate that a storm meeting severe criteria is developing or moving into the warned area. Organizations within the warned area should alert employees/members and instruct them to take appropriate protection measures.

Those attending outdoor events should be instructed to immediately implement contingency plans and take shelter. If there is enough time, HyperReach may be utilized.

Severe Storm

Severe storms usually occur April through September. These include thunderstorms, hailstorms and rain that can produce flooding. Severe weather moves quickly and can precede tornadoes.

Hurricane

A hurricane is defined as a tropical storm that has sustained winds of 74 miles per hour or greater. Besides high winds, hurricanes can cause torrential rain, coastal surges, inland flooding and tornadoes. Hurricane season officially beings on June 1 and ends November 30. As a storm approaches, forecasters may declare a hurricane warning or a hurricane watch. If it is a warning, be aware that hurricane conditions are expected to develop within 24 hours. A watch indicates that hurricane conditions are possible within 36 hours.

Landslide

Landslides typically occur during the spring, summer and fall months due to severe weather with high precipitation. Landslides can also occur as a result of an earthquake or human-caused activity. Landslides have the ability to disrupt transportation and can also cause death or injury to vehicle occupants in the slide area.

Drought

A drought can occur year round. A majority of the drought occurs and worsens during summer months with low relative humidity levels. During droughts, there is an increase in ignition fuel, which created a greater fire danger. Drought also causes stress to wildlife populations and droughts can lead to water rationing for the human population.

The **Sperry–Piltz Ice Accumulation Index**, or **SPIA Index**, is a scale for rating ice storm intensity, based on the expected footprint of an ice storm, the expected ice accumulation as a result of a storm, and the expected damage a storm inflicts on human-built structures, especially exposed overhead utility systems such as power lines. The official SPIA Index category is determined by meteorologists following the passing of a storm.

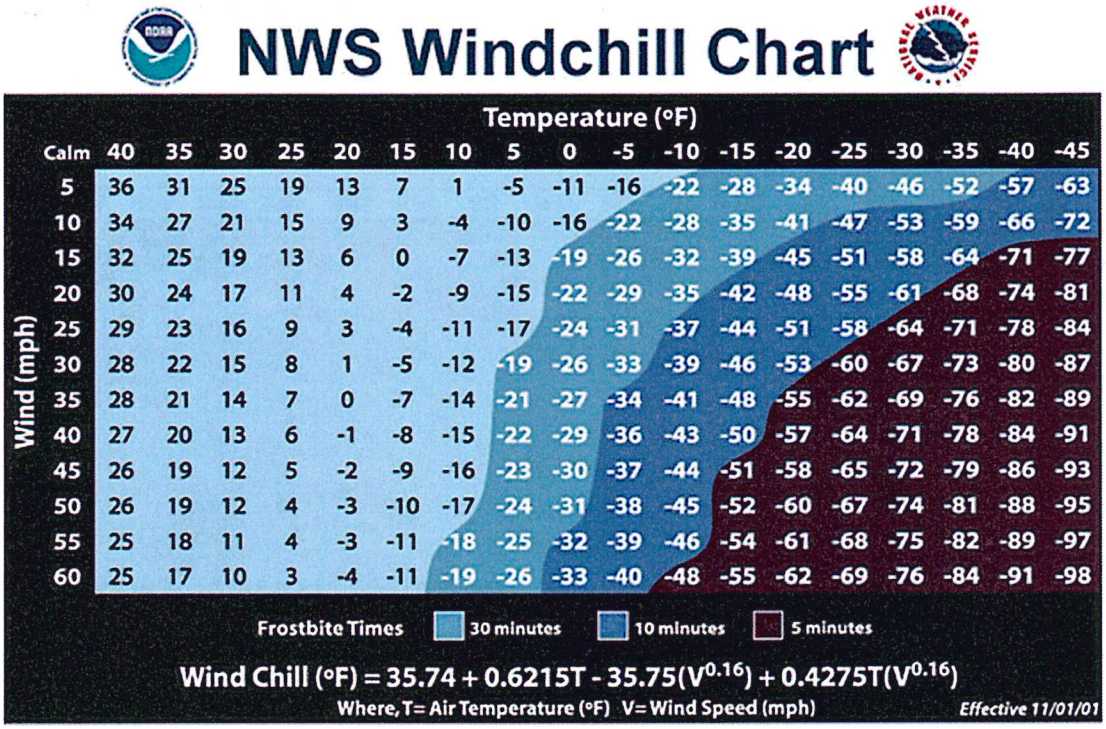
The Sperry-Piltz Ice Accumulation Index, or "SPIA Index" – Copyright, February, 2009

ICE DAMAGE INDEX	DAMAGE AND IMPACT DESCRIPTIONS
0	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
2	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
3	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days.
4	Prolonged & widespread utility interruptions with extensive damage to main distribution feeder lines & some high voltage transmission lines/structures. Outages lasting 5 – 10 days.
5	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.

(Categories of damage are based upon combinations of precipitation totals, temperatures and wind speeds/directions.)

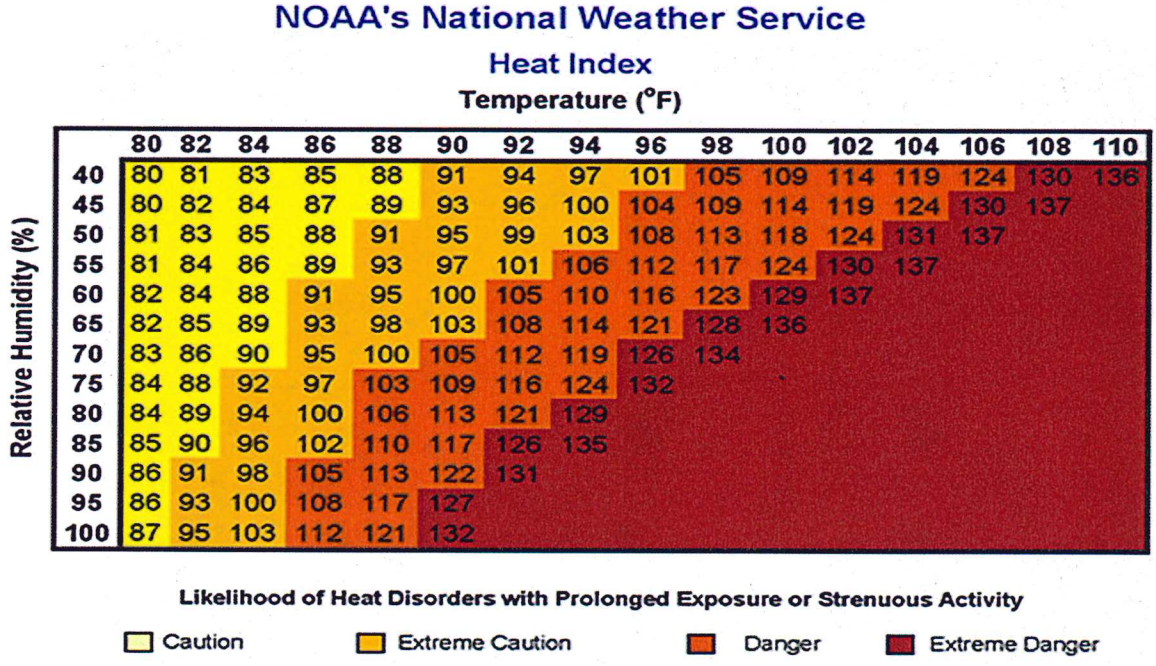
Wind Chill Factor Index

Wind-chill is the perceived decrease in air temperature felt by the body on exposed skin due to the flow of air.



Heat Index

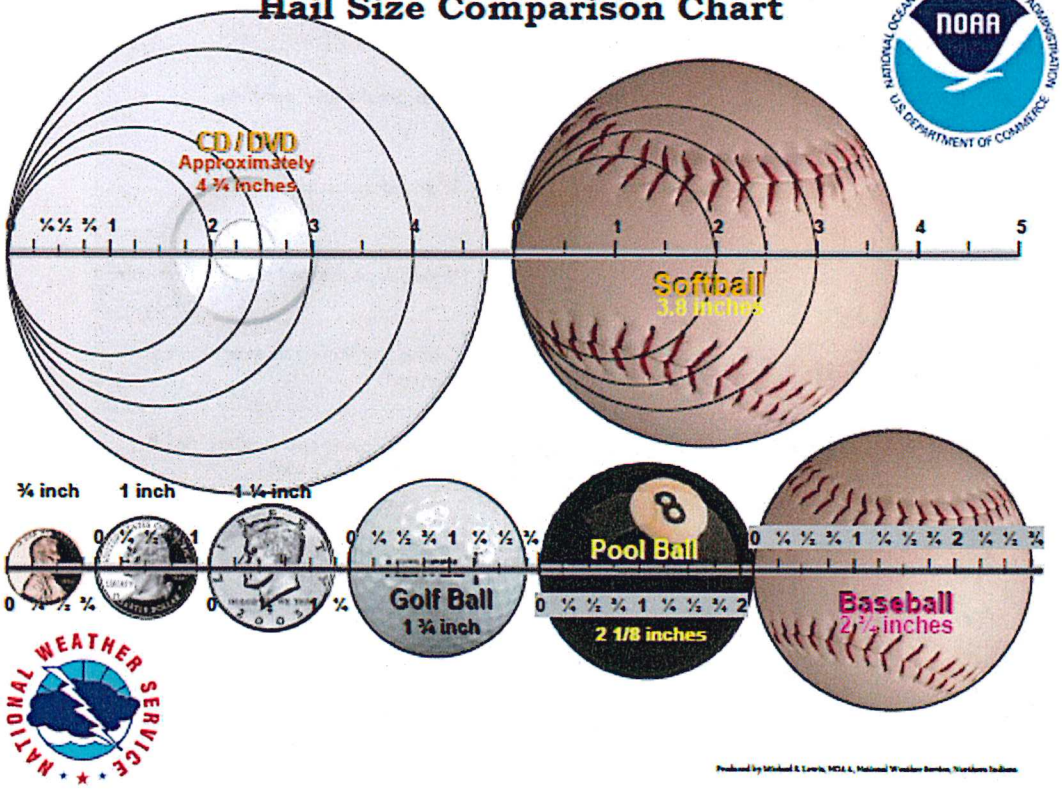
The heat index (HI) or humiture or humidex is an index that combines air temperature and relative humidity in an attempt to determine the human-perceived equivalent temperature—how hot it feels. The result is also known as the "felt air temperature" or "apparent temperature".



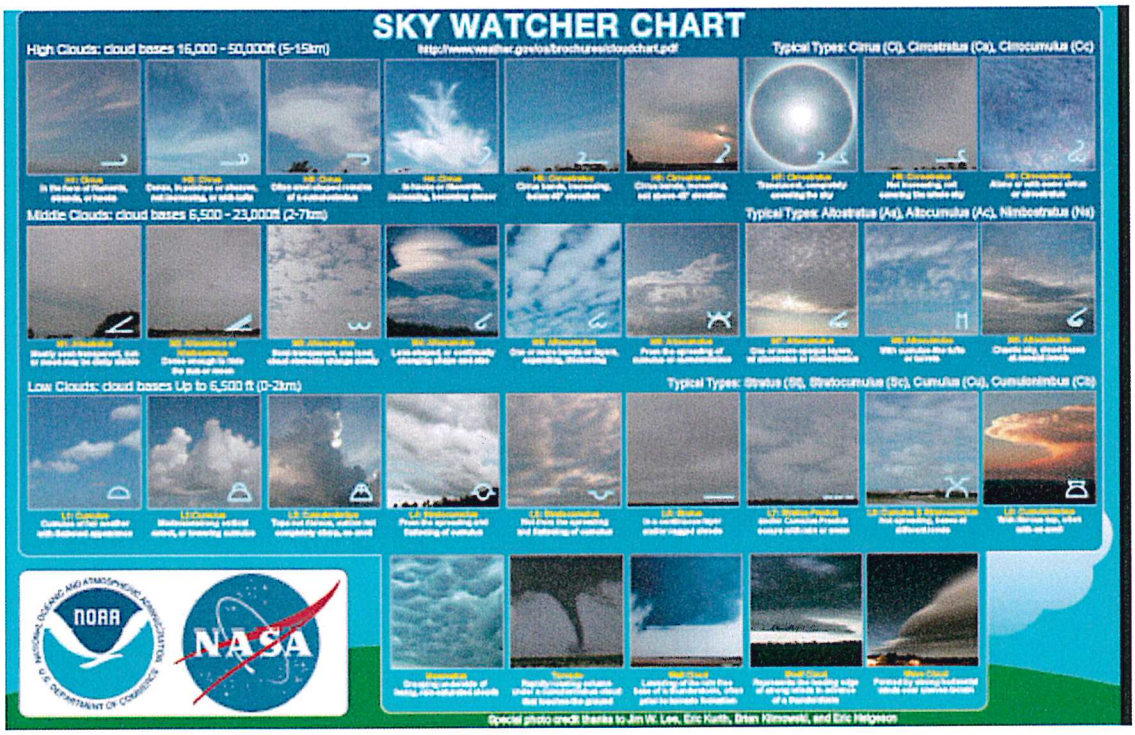
Beaufort Wind Scale (Estimated wind speeds)

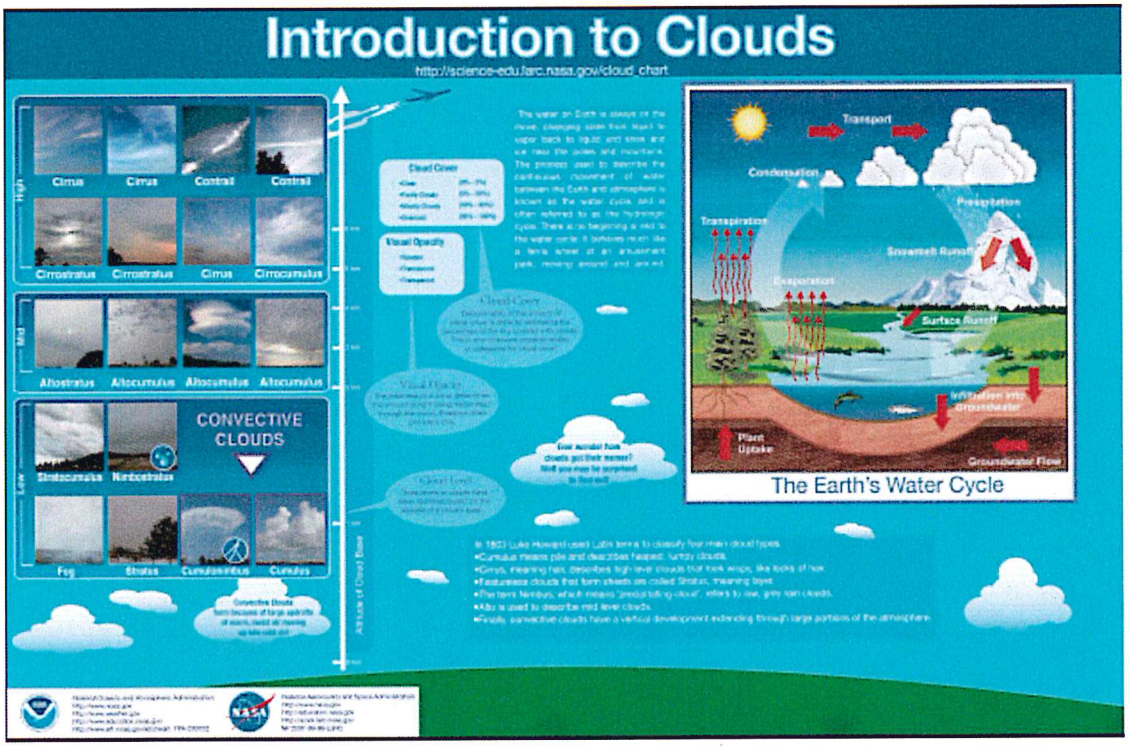
Beaufort number	Wind speed			Mean wind speed (kt / km/h / mph)	Description	Land conditions
	kt	km/h	Mph			
0	0	0	0	0 / 0 / 0	Calm	Calm. Smoke rises vertically.
1	1-3	1-6	1-3	2 / 4 / 2	Light air	Wind motion visible in smoke.
2	4-6	7-11	4-7	5 / 9 / 6	Light breeze	Wind felt on exposed skin. Leaves rustle.
3	7-10	12-19	8-12	9 / 17 / 11	Gentle breeze	Leaves and smaller twigs in constant motion.
4	11-15	20-29	13-18	13 / 24 / 15	Moderate breeze	Dust and loose paper is raised. Small branches begin to move.
5	16-21	30-39	19-24	19 / 35 / 22	Fresh breeze	Smaller trees sway.
6	22-27	40-50	25-31	24 / 44 / 27	Strong breeze	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult.
7	28-33	51-62	32-38	30 / 56 / 35	Near gale	Whole trees in motion. Effort needed to walk against the wind.
8	34-40	63-75	39-46	37 / 68 / 42	Gale	Twigs broken from trees. Cars veer on road.
9	41-47	76-87	47-54	44 / 81 / 50	Severe gale	Light structure damage.
10	48-55	88-102	55-63	52 / 96 / 60	Storm	Trees uprooted. Considerable structural damage.
11	56-63	103-119	64-73	60 / 112 / 70	Violent storm	Widespread structural damage.
12	64-80	120	74-95	73 / 148 / 90	Hurricane	Considerable and widespread damage to structures.

Hail Size Comparison Chart



Produced by Michael S. Lewis, NOAA, National Weather Service, Northern Indiana


SKY WATCHER CHART
High Clouds: cloud bases 16,000 - 50,000ft (5-15km)
Typical Types: Cirrus (Ci), Cirrostratus (Cs), Cirrocumulus (Cc)
Middle Clouds: cloud bases 6,500 - 23,000ft (2-7km)
Typical Types: Altostratus (As), Altocumulus (Ac), Nimbostratus (Ns)
Low Clouds: cloud bases Up to 6,500 ft (0-2km)
Typical Types: Stratus (St), Stratocumulus (Sc), Cumulus (Cu), Cumulonimbus (Cb)
NOAA
NASA
Special photo credit thanks to Jim W. Lee, Eric Nath, Brian Klimowski, and Eric Nguyen


Introduction to Clouds
http://science-edu.larc.nasa.gov/cloud_chart
Cirrus
Cirrus
Contrail
Contrail
Cirrostratus
Cirrostratus
Cirrus
Cirrocumulus
Altostratus
Altocumulus
Altocumulus
Altocumulus
CONVECTIVE CLOUDS
Stratocumulus
Nimbostratus
Fog
Stratus
Cumulonimbus
Cumulus
Cloud Cover
Visual Opacity
Transport
Condensation
Precipitation
Transpiration
Snowmelt Runoff
Evaporation
Surface Runoff
Infiltration into Groundwater
Plant Uptake
Groundwater Flow
The Earth's Water Cycle