



State of Illinois
Illinois Emergency Management Agency

Lightning Safety Awareness Guide



LIGHTNING FACT SHEET

There are an estimated 23 million cloud-to-ground lightning flashes each year in the United States, nearly 800,000 of which occur in Illinois alone. Lightning can be fascinating to watch, but it is also extremely dangerous – it is the underrated killer. Few people really understand the dangers of lightning. Many people don't act promptly to protect their lives, property and the lives of others. The first step in solving this potentially life-threatening problem is through education.

Lightning Facts

- On average, 54 people are killed and more than 1,000 are injured by lightning strikes in the United States each year.
- In 2012, 28 people were killed by lightning strikes in the United States. Nearly 90% of lightning victims were males. A majority of victims were either outdoors in an open area, or taking part in an activity near the water such as fishing, tubing or swimming.
- In the past 50 years, 101 people have been killed by lightning in Illinois.
- On average, about 67% of lightning fatalities and injuries occur outdoors at recreation events (sports fields, golf courses, lakes, swimming pools) and near trees.
- Illinois ranks eighth in the country for the most lightning strikes and second in the Midwest, behind Missouri.
- Lightning results in an economic impact of about \$5 billion in the United States each year. It is also one of the leading causes of forest fires.
- The odds of an individual being a lightning casualty are about 280,000-to-one in any given year in the United States. You have a hundred times greater chance of being struck by lightning than winning the lottery.
- **Simply put – No place outdoors is safe when a thunderstorm is near.**



Outdoors

While no one can completely eliminate the risk of being struck by lightning, you can greatly reduce your risk of becoming a lightning casualty by following some basic rules.

PLAN AHEAD. If thunderstorms are in the forecast, consider postponing outdoor activities. At the very least, have a portable NOAA Weather Alert Radio that will alert you to changes in the weather. Weather applications for mobile devices can also help to alert you of threatening weather.

WATCH THE SKY. Make sure you, or someone in your group, monitor current weather conditions. Look for approaching dark clouds and changes in the sky. This is especially important if you need time to get to a safe place. The static on an AM radio frequency can also alert you to approaching thunderstorms.

COACHES AND OFFICIALS NEED A SAFETY PLAN. Outdoor events are very susceptible to lightning strikes because these activities take place in open areas. If you or your children are involved in outdoor recreational activities, verify that scout leaders, coaches, umpires, referees and camp counselors have guidelines for postponing outdoor events **BEFORE** thunderstorms approach. The safety of the participants and the spectators must be the number one priority.



WHEN THUNDER ROARS, GO INDOORS. When you can hear thunder, you are close enough to the storm to be struck by lightning, even if it isn't raining. Get indoors immediately. Once indoors, stay there for 30 minutes after hearing the last rumble of thunder before resuming outdoor activities. **REMEMBER:** this is a guideline and is not as useful if the thunderstorm is actually forming overhead. The first strike of lightning may occur very near you. You won't have the ability to "hear it coming." So remember to keep an "eye on the sky" if clouds begin to build and darken.

GET AWAY FROM WATER. Stop activities in or near water, such as swimming, boating, fishing and camping, and seek a substantial shelter.

LIGHTNING SAFETY TIPS

- The best shelter from lightning is inside a substantial building with the windows and doors closed.
- If no substantial shelter is available, seek refuge in a hard-topped vehicle, with the windows closed.
- **Avoid** carports, porches, garages, sheds, tents, baseball dugouts, under bleachers or any rain shelter that does not have windows and doors that can be closed.
- If there is no safe shelter anywhere nearby, seek lower elevation areas away from trees, metallic objects and bodies of water. Stay away from trees, electrical poles or other tall objects.

Lightning Safety on the Job

People who work outdoors in open spaces, on or near tall objects, with explosives, or with metal have a large exposure to lightning risks. Workers in these occupations are among those with the most risk:

- Farming and Field Labor
- Power / Utility Field Repair
- Construction and Building Maintenance
- Heavy Equipment Operation
- Plumbing and Pipefitting
- Explosives Handling or Storage
- Logging

DON'T START ANYTHING THAT CAN'T BE STOPPED QUICKLY

Pay attention to the daily forecast so you know what to expect. Be alert for early signs of thunderstorms such as increasing winds, dark clouds, rain or distant rumbles of thunder.

ASSESS YOUR LIGHTNING RISK AND TAKE ACTION

When you can hear thunder, you are close enough to the storm to be struck. Stop what you are doing immediately and take shelter in a substantial building or in a hard-topped vehicle.

IF A CO-WORKER IS STRUCK BY LIGHTNING

Lightning victims are safe to handle – they do NOT carry any electrical charge. Call 9-1-1 IMMEDIATELY. Check to see if a lightning victim has a pulse and is breathing. If not, administer CPR immediately, if properly trained, and get the victim advanced life-saving medical attention.

KNOW YOUR COMPANY'S SAFETY GUIDELINES

Businesses with high risk functions, such as explosives handling or utility repair during severe weather, should have a formal lightning warning policy that meets these two requirements:

- Lightning danger warnings that can be issued in time for everyone to get to a safe location.
- Access to a safe place.

OBJECTS, EQUIPMENT AND AREAS TO AVOID

- Anything tall or high, including roofs, scaffolding, ladders, utility poles or trees.
- Large equipment such as bulldozers, cranes, backhoes and tractors.
- Materials or surfaces that conduct electricity like metal tools or equipment, utility lines, water, water pipes and plumbing.
- Areas where explosives or munitions are located.

Indoors

A house or other substantial building offers the best protection from lightning. Open shelters, carports, garages and sheds are designed to protect people and property from rain and sun – **NOT** lightning.

There are three main ways lightning enters a building:

- A direct strike
- Through wires or pipes that extend outside the building
- Through the ground

Once in a structure, the current from a lightning strike can travel through electrical lines, plumbing, phone lines, and radio or TV reception systems. Lightning can also travel through any metal wiring or bars in concrete walls or flooring.

AVOID CONTACT WITH CORDED PHONES

Phone use is the leading cause of indoor lightning injuries in the United States. Cordless phones are safe, as long as lightning does not strike while you are removing the phone from the charging cradle. Cell phones are the safest method of communication.

STAY AWAY FROM WINDOWS AND EXTERIOR DOORS

Windows and doors can provide a path for a direct strike to enter a home.

STAY OFF PORCHES AND DECKS

Even if a porch or deck is covered, it does not offer any protection from lightning strikes.

AVOID CONTACT WITH ELECTRICAL EQUIPMENT OR CORDS

Direct strikes and power surges due to lightning cause significant damage to personal property each year. If you plan to unplug any electronic equipment, do so well before the storm arrives. Do not forget to disconnect televisions and radios from outdoor antennas.

STAY AWAY FROM PLUMBING AND PLUMBING APPLIANCES

Avoid contact with pipes during a thunderstorm. Do not take a shower or bath. Avoid appliances such as dishwashers, washing machines and electric hot water heaters, since they utilize both water and electricity.

BE ALERT FOR DIRECT LIGHTNING STRIKES

If your home or a neighbor's home is directly struck by lightning, call the fire department immediately. Have the electrical wiring in your home inspected by a qualified electrical contractor as soon as possible.

Lightning Strike Injuries

If a person is struck by lightning, immediate medical attention may be the difference between life and death. With proper medical treatment, most victims can survive a lightning strike. However, the long-term effects on their lives and the lives of their family members can be devastating.

VICTIMS DO NOT CARRY ANY ELECTRICAL CHARGE

It is important that lightning strike victims receive immediate medical attention – call 9-1-1! They are safe to handle and cannot injure anyone providing medical attention.

LIGHTNING CAUSES CARDIAC ARREST IN MOST FATALITIES

The surge of electricity through a person's body results in cardiac arrest being the immediate cause of death in most lightning fatalities. Check to see if a lightning victim has a pulse and is breathing. If not, administer CPR immediately, if properly trained, and get the victim advanced life-saving medical attention.

ONLY A FEW VICTIMS SUFFER BURNS

Physically, only a few lightning strike victims actually suffer burns, and these are usually minor. Most lightning burns occur in the extremities where the current either enters or exits the body.

SOME OF THE LONG-TERM SIDE EFFECTS REPORTED BY LIGHTNING STRIKE SURVIVORS ARE:

- Memory loss
- Personality changes
- Difficulty carrying on more than one task at a time
- Fatigue
- Irreparable nerve damage
- Chronic pain and/or headaches
- Difficulty sleeping
- Dizziness

Note: Some symptoms may not appear until several months after the lightning strike.

The main support group for lightning strike survivors is “Lightning Strike and Electric Shock Survivors International, Inc.” (www.lightning-strike.org).

The Science of Lightning

By definition, all thunderstorms contain lightning. Lightning can strike the ground or ground-based objects, within the thunderstorm cloud, from one thunderstorm to another or into the atmosphere. Thunderstorms are most likely to develop on warm spring or summer days, but they can occur any time of the year.

THE DEVELOPMENT OF A THUNDERSTORM

Pockets of air rise into the atmosphere, either forced by a front or due to heating of the earth on a sunny day. When this air reaches a certain level in the atmosphere, cumulus clouds start to form. Continued heating of the moist air can cause these clouds to grow vertically upward in the atmosphere, into “towering cumulus” clouds. These clouds may be the first indication of a developing thunderstorm, or cumulonimbus cloud.

HOW LIGHTNING FORMS

Lightning is produced because of the mixture and collisions of ice crystals high in the thunderstorm with raindrops and hailstones in the lower parts of the storm. The lighter ice crystals become positively charged and are carried into the highest parts of the cloud. Heavier hail and rain gather a negative charge and fall toward the lower part of the cloud. The earth’s surface normally has a slight negative charge. However, as the negative charges build-up in the lower part of the cloud, the ground beneath it and surrounding locations become positively charged. Initially, the air acts as an insulator between these differing charges. However, when the electrical potential between the two charges becomes too great, there is a discharge of electricity known as LIGHTNING.

LIGHTNING AND THUNDER

Lightning is the giant spark of electricity that occurs within the atmosphere. As it passes through the air, the one inch diameter or less bolt of lightning rapidly heats the air to a temperature of 50,000 degrees Fahrenheit, which is hotter than the surface of the sun. The air expands rapidly due to the heating, then quickly contracts as it cools back to its normal temperature. This creates a **shockwave** that we hear as THUNDER.

HEAT LIGHTNING

Heat lightning is simply lightning from a distant thunderstorm that is too far away for the resultant thunder to be heard. In most cases, the light you observe is being reflected off of clouds near the horizon tens of miles away. Keep an eye on the storm though, since it may be headed in your direction.

LITTLE KNOWN LIGHTNING FACTS

- Many cloud-to-ground lightning flashes have “forked” or multiple attachment points to earth. Recent studies indicated that 50-70% of cloud-to-ground lightning strikes are forked.
- Lightning can spread out nearly 60 feet after striking the earth, depending on soil characteristics.
- Lightning can strike the same place twice.
- An increase in lightning activity or a rapid change in lightning polarity can be a precursor to a severe thunderstorm or tornado.

Sources of Lightning and Weather Safety Information

For additional information on lightning and other severe weather hazards, contact the following:

Ready Illinois www.ready.illinois.gov

The National Weather Service Lightning Safety website
www.lightningsafety.noaa.gov

Coaches and Sports Officials Guide to Lightning Safety
<http://www.lightningsafety.noaa.gov/resources/CoachGuide.pdf>

Lightning Strike and Electrical Shock Survivors International, Inc.
www.lightning-strike.org

Your local Emergency Management Agency (EMA)

Your local chapter of the American Red Cross (ARC) or www.redcross.org

The National Lightning Safety Institute www.lightningsafety.com

The nearest office of the National Weather Service (NWS)

National Weather Service Forecast Office websites:

Quad Cities IA/IL www.weather.gov/dvn

Chicago, IL www.weather.gov/lot

Central Illinois (Lincoln) www.weather.gov/ilx

St. Louis, MO www.weather.gov/lSX

Paducah, KY www.weather.gov/pah

NOAA Weather Radio – All Hazards

Listen to NOAA Weather Radio-All Hazards for the latest weather forecasts. The National Weather Service broadcasts weather information 24 hours a day, including watches, warnings and advisories. Weather radio transmitters have a range of about 40 miles. Weather radio transmitters that cover the counties in Illinois are shown below. For more information go to: <http://www.nws.noaa.gov/nwr/CntyCov/nwrIL.htm>

COUNTY	FREQ (MHz)	STATION	SAME CODE
Adams	162.475 162.450 162.500	Hannibal Kahoka Macomb	017001
Alexander	162.550 162.425	Cape Girardeau Marion	017003
Bond	162.425 162.475	Hillsboro Salem	017005
Boone	162.500 162.550 162.425 162.475	Crystal Lake DeKalb Janesville Rockford	017007
Brown	162.475 162.525 162.500	Hannibal Jacksonville Macomb	017009
Bureau	162.525 162.425	Dixon Princeton	017011
Calhoun	162.450	Jerseyville	017013
Carroll	162.525 162.400 162.450 162.425	Dixon Dubuque Freeport Maquoketa	017015
Cass	162.525 162.500 162.400	Jacksonville Macomb Springfield	017017
Champaign	162.550	Champaign	017019
Christian	162.500 162.400	Shelbyville Springfield	017021
Clark	162.450 162.525	Newton Paris	017023
Clay	162.450	Newton	017025
Clinton	162.475	Salem	017027
Coles	162.550 162.525	Champaign Paris	017029
Cook	162.550 162.500 162.425	Chicago Crystal Lake Lockport	017031
Crawford	162.450	Newton	017033
Cumberland	162.450	Newton	017035

COUNTY	FREQ (MHz)	STATION	SAME CODE
DeWitt	162.550 162.400	Champaign Springfield	017037
DeKalb	162.550 162.400 162.475	DeKalb Plano Rockford	017039
Douglas	162.550 162.525	Champaign Paris	017041
DuPage	162.550 162.425 162.400	Chicago Lockport Plano	017043
Edgar	162.550 162.525	Champaign Paris	017045
Edwards	162.550 162.450	Evansville Newton	017047
Effingham	162.450 162.500	Newton Shelbyville	017049
Fayette	162.425 162.475 162.500	Hillsboro Salem Shelbyville	017051
Ford	162.550 162.500 162.450	Champaign Crescent City Odell	017053
Franklin	162.425	Marion	017055
Fulton	162.500 162.475	Macomb Peoria	017057
Gallatin	162.400	McLeansboro	017059
Greene	162.525 162.450	Jacksonville Jerseyville	017061
Grundy	162.425 162.450 162.400	Lockport Odell Plano	017063
Hamilton	162.400	McLeansboro	017065
Hancock	162.525 162.450 162.500	Burlington Kahoka Macomb	017067
Hardin	162.425	Marion	017069
Henderson	162.525 162.500	Burlington Macomb	017071

COUNTY	FREQ (MHz)	STATION	SAME CODE
Henry	162.425 162.550	Princeton Quad Cities	017073
Iroquois	162.500 162.525 162.450	Crescent City Kankakee Odell	017075
Jackson	162.425	Marion	017077
Jasper	162.450	Newton	017079
Jefferson	162.475	Salem	017081
Jersey	162.450	Jerseyville	017083
Jo Daviess	162.400 162.450 162.425	Dubuque Freeport Maquoketa	017085
Johnson	162.425	Marion	017087
Kane	162.500 162.550 162.425 162.400	Crystal Lake DeKalb Lockport Plano	017089
Kankakee	162.500 162.525 162.425 162.450	Crescent City Kankakee Lockport Odell	017091
Kendall	162.425 162.400	Lockport Plano	017093
Knox	162.400 162.500 162.475	Galesburg Macomb Peoria	017095
Lake	162.550 162.500 162.450	Chicago Crystal Lake Racine	017097
LaSalle	162.450 162.400 162.425	Odell Plano Princeton	017099
Lawrence	162.450	Newton	017101
Lee	162.550 162.525 162.425 162.475	DeKalb Dixon Princeton Rockford	017103
Livingston	162.450	Odell	017105
Logan	162.400	Springfield	017107
McDonough	162.500	Macomb	017109
McHenry	162.500 162.450	Crystal Lake Racine	017111
McLean	162.525 162.450 162.475	Bloomington Odell Peoria	017113

COUNTY	FREQ (MHz)	STATION	SAME CODE
Macon	162.400	Springfield	017115
Macoupin	162.425 162.450 162.400	Hillsboro Jerseyville Springfield	017117
Madison	162.450 162.550	Jerseyville St. Louis	017119
Marion	162.475	Salem	017121
Marshall	162.450 162.475 162.425	Odell Peoria Princeton	017123
Mason	162.500 162.475 162.400	Macomb Peoria Springfield	017125
Massac	162.425 162.475	Marion Mayfield	017127
Menard	162.400	Springfield	017129
Mercer	162.525 162.550	Burlington Quad Cities	017131
Monroe	162.550	St. Louis	017133
Montgomery	162.425 162.400	Hillsboro Springfield	017135
Morgan	162.525 162.400	Jacksonville Springfield	017137
Moultrie	162.550 162.500	Champaign Shelbyville	017139
Ogle	162.550 162.525 162.450 162.475	DeKalb Dixon Freeport Rockford	017141
Peoria	162.475	Peoria	017143
Perry	162.450 162.425	Chester Marion	017145
Piatt	162.550	Champaign	017147
Pike	162.475 162.525	Hannibal Jacksonville	017149
Pope	162.425 162.475	Marion Mayfield	017151
Pulaski	162.425	Marion	017153
Putnam	162.475 162.425	Peoria Princeton	017155
Randolph	162.450	Chester	017157
Richland	162.450	Newton	017159
Rock Island	162.550	Quad Cities	017161
St. Clair	162.550	St. Louis	017163

COUNTY	FREQ (MHz)	STATION	SAME CODE
Saline	162.425 162.400	Marion McLeansboro	017165
Sangamon	162.400	Springfield	017167
Schuyler	162.500	Macomb	017169
Scott	162.525	Jacksonville	017171
Shelby	162.500	Shelbyville	017173
Stark	162.475 162.425	Peoria Princeton	017175
Stephenson	162.450 162.425 162.475	Freeport Janesville Rockford	017177
Tazewell	162.525 162.475	Bloomington Peoria	017179
Union	162.550 162.425	Cape Girardeau Marion	017181
Vermilion	162.550 162.500	Champaign Crescent City	017183
Wabash	162.550	Evansville	017185
Warren	162.525 162.400	Burlington Galesburg	017187
Washington	162.475	Salem	017189
Wayne	162.450 162.475	Newton Salem	017191
White	162.550 162.400	Evansville McLeansboro	017193
Whiteside	162.525 162.425 162.550	Dixon Princeton Quad Cities	017195
Will	162.525 162.425 162.450 162.400	Kankakee Lockport Odell Plano	017197
Williamson	162.425	Marion	017199
Winnebago	162.550 162.450 162.425 162.475	DeKalb Freeport Janesville Rockford	017201
Woodford	162.525 162.450 162.475	Bloomington Odell Peoria	017203



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