State of Illinois
Illinois Emergency Management Agency

Lightning Safety Awareness

IEMA

American Red Cross

NOAA

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LIGHTNING FACT SHEET

There are an estimated 25 million cloud-to-ground lightning flashes each year in the United States, nearly 650,000 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.

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Lightning Facts

- On average, 58 people are killed by lightning in the United States each year. This is more than those killed by tornadoes (55) and hurricanes (47).
- It is estimated that more than 1,000 people are injured by lightning strikes in the United States each year.
- In 2009, 34 people were killed by lightning strikes in the United States. Nearly 60% of the fatalities occurred in open areas outdoors, while 15% of those killed were standing under a tree.
- Ninety-nine people have been killed by lightning in Illinois in the past 49 years.
- Lightning strikes caused an estimated $2 Million in damage to personal property in Illinois during 2009.
- Lightning results in an economic impact of about $5 Billion in the U.S. each year. It is also one of the leading causes of forest fires.
- On average, about 67% of lightning fatalities and injuries occur outdoors at recreation events (baseball games, soccer games, lakes, and on golf courses), and under or near trees.
- The odds of an individual being a lightning casualty are about 280,000-to-one in any given year in the United States. The odds of winning the lottery are a HUNDRED times greater!
- **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.

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 Radio that will alert you to changes in the weather.

- **WATCH THE SKY!** Make sure you, or someone in a group of people, monitor the weather conditions. 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 & 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 – OUTDOORS:**

  - 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** car ports, porches, garages, sheds, tents, baseball dugouts, under bleachers, or any rain shelter which does not have windows and doors that can be closed.

  - **Stay away** from trees, electrical poles, or other tall objects.

  - If there is no safe shelter anywhere nearby, seek lower elevation areas away from trees, metallic objects and bodies of water.

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.

◆ **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

◆ **ASSESS YOUR LIGHTNING RISK AND TAKE ACTION**
When you 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.

◆ **OBJECTS & EQUIPMENT 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.
- ■ Leave areas where explosives or munitions are located.

◆ **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! If the victim's heart is stopped or they stopped breathing, administer CPR immediately, if properly trained.

When you hear thunder, you are close enough to the storm to be struck.

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:

1. A direct strike
2. Through wires or pipes that extend outside the building
3. 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 OF 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 causes 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.

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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 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" (www.lightning-strike.org)

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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.

Lightning is produced because of the mixture and collisions of ice crystals, high in the thunderstorm, with rain drops and hailstones in the lower parts of the storm.

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 rain drops 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 gathers a negative charge and falls 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 & 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 °F – 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 the 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:

Your local Emergency Management Agency (EMA)

Illinois Emergency Management Agency www.state.il.us/iema

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

The National Lightning Safety Institute www.lightningsafety.com

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

Ready Illinois www.ready.illinois.gov

COACH'S and SPORTS OFFICIAL'S GUIDE TO LIGHTNING SAFETY
http://www.lightningsafety.noaa.gov/resources/CoachGuide.pdf

The nearest office of the National Weather Service (NWS)
National Weather Service Forecast Office websites:

Davenport, IA	www.crh.noaa.gov/dvn
Romeoville, IL	www.crh.noaa.gov/lot
Lincoln, IL	www.crh.noaa.gov/ilx
St. Louis, MO	www.crh.noaa.gov/lsx
Paducah, KY	www.crh.noaa.gov/pah

NOAA WEATHER RADIO

Listen to NOAA Weather Radio All Hazards for the latest weather forecasts. The National Weather Service broadcasts weather information, including watches, warnings and advisories 24 hours a day. Weather radio transmitters have a range of about 40 miles. Weather radio transmitters that cover Illinois are shown below. To determine the weather radio coverage area for each county in Illinois, go to:

http://www.nws.noaa.gov/nwr/CntyCov/nwrIL.htm

CITY	STATION	FREQUENCY
Bloomington	KZZ-65	162.525 MHZ
Cape Girardeau, MO	KXI-93	162.550 MHZ
Champaign	WXJ-76	162.550 MHZ
Chester	KXI-42	162.450 MHZ
Chicago	KWO-39	162.550 MHZ
Crescent City	KXI-86	162.500 MHZ
Crystal Lake	KXI-41	162.500 MHZ
DeKalb	WNG-536	162.550 MHZ
Dixon	KZZ-55	162.525 MHZ
Dubuque, IA	WXL-64	162.400 MHZ
Edwardsport, IN	WWG-82	162.425 MHZ
Evansville, IN	KIG-76	162.550 MHZ
Freeport	KZZ-56	162.450 MHZ
Galesburg	KZZ-66	162.400 MHZ
Hannibal, MO	WXK-82	162.475 MHZ
Hillsboro	KXI-79	162.425 MHZ
Jacksonville	WXM-90	162.525 MHZ
Jerseyville	KXI-70	162.450 MHZ
Kankakee	KZZ-58	162.525 MHZ
Lockport	KZZ-81	162.425 MHZ
Macomb	WXJ-92	162.500 MHZ
Maquoketa, IA	KZZ-83	162.500 MHZ
Marion	WXM-49	162.425 MHZ
Mayfield, KY	KIH-46	162.475 MHZ
McLeansboro	KXI-52	162.400 MHZ
Medill, MO	WXL-99	162.450 MHZ
Newton	KXI-48	162.450 MHZ
Odell	WXK-24	162.450 MHZ
Paris	KXI-47	162.525 MHZ
Peoria	WXJ-71	162.475 MHZ
Plano	KXI-58	162.400 MHZ
Princeton	WXL-22	162.425 MHZ
Putnamville, IN	WXK-72	162.400 MHZ
Racine, WI	KZZ-76	162.450 MHZ
Rock Island (Moline)	WXJ-73	162.550 MHZ
Rockford	KZZ-57	162.475 MHZ
Salem	KXI-49	162.475 MHZ
Shelbyville	KXI-46	162.500 MHZ
Springfield	WXJ-75	162.400 MHZ
St. Louis, MO	KDO-89	162.550 MHZ
West Burlington, IA	WXN-83	162.525 MHZ

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