

SAFETY DIRECTOR BULLETIN

LIGHTNING SAFETY BEST PRACTICES

Every year, lightning strikes and kills people on or near bodies of water, parks, and athletic fields. Summer is the peak season for outdoor and water-related activities, and when most lightning deaths and injuries occur. Lightning cannot be prevented, but the vulnerability of lifeguards, beach-goers, and users of recreational facilities can be minimized. High-risk locations include beaches and lifeguard stands, outdoor pools and diving boards, marinas, golf courses, other athletic fields, and playgrounds.

Unfortunately, this was evidenced recently on an Ocean County beach. A 19-year-old lifeguard died in the line of duty when he was struck by lightning from a fast-approaching storm while on his stand. National Weather Service data shows this was the second lightning death in the State this year. New Jersey is one of 10 states with the highest number of lightning deaths and injuries, according to the [Centers for Disease Control and Prevention](#).

Lightning Myths and Facts¹

Myth: Metal objects like umbrellas, baseball bats, and bleachers attract lightning.

Truth: Metal does not attract lightning. Height, a pointy shape, and isolation are the dominant factors controlling where a lightning bolt will strike. It is the shape and height of the object that primarily attracts lightning, not the material. However, metal does conduct electricity, so if the metal is struck and you are touching it, your risk of electrocution is increased.

Myth: It's just heat lightning.

Truth: There is no such thing as heat lightning. All lightning originates from a thunderstorm. If you can see lightning but don't hear thunder, it is simply because the storm is far away but could be moving towards you. Lightning can strike more than 10 miles from the storm. You should still take precautions.

Annual training for lifeguard and beach patrol units should include lightning awareness and a review of protocols in their hazardous weather safety plan. Education should include facts about the dangers of lightning and locations that provide protection. Action plans need to be developed to protect employees and residents using public facilities and beaches. A sample [Emergency Action Plan](#) for beaches can be downloaded from the [United States Lifesaving Association](#). The [National Oceanic and Atmospheric Association \(NOAA\)](#) has an [Emergency Action Toolkit](#) for other public facilities.

Myth: Lightning electrifies its victims. If you touch them, you will be electrocuted.

Truth: The human body doesn't store electricity. If someone is struck by lightning, it is safe to touch the victim to administer first aid.

When responding to a lightning injury, ensure scene safety. Follow local protocols for trauma injury and triage. If necessary and safe to do so, move the victim to a location away from the threat of another lightning strike. It is another myth that lightning never strikes the same place twice.

¹ [Lightning Myths and Facts](#)

Lightning Detection and Early Warning Systems

Weather forecasts. National Weather Service (NWS) Advisories, Watches, and Warnings can be monitored at [NOAA](#). Severe weather forecasts can be found at the [NOAA/National Weather Service Storm Prediction Center](#).

Myth: Using a mobile app is good enough to monitor lightning.

Truth: An app's ability to monitor lightning is limited by its proximity to a cell phone tower. If multiple people are monitoring lightning, there may be differences in their readings, which could confuse them.

Public agencies should consider deploying early warning lightning detection systems similar to the systems deployed at some outdoor athletic complexes. Adding detection equipment at shore beaches can be added to equipment or systems already deployed at these athletic complexes.

Available technologies of present-day lightning detectors include:

- 1. Radio Frequency (RF) Detectors.** RF detectors measure energy discharges from lightning. They can determine the approximate distance and direction of the threat. Operational frequency is important. Consider these spectrum breadths:
 - WeatherBug Total Lightning Network (WTLN) - 1.0 kHz through 12 MHz
 - National Lightning Detection Network (NLDN) - 1.0 kHz through 350 kHz
 - United States Precision Lightning Network (USPLN) - 1.5 kHz through 400 kHz
 - Lightning Detection and Ranging II (LDAR-II) - 50 MHz through 120 MHz
 - New Mexico Tech (NMT) Array - 60 MHz through 78 MHz
 - Surveillance et Alerte Foudre par Interferometrie Radioelectrique (SAFIR) - 109 through 119 MHz
- 2. Interferometers.** These are multi-station devices, much more costly than RF detectors. They measure lightning strike data more precisely. Usually, they require a skilled operator and are employed for research purposes.
- 3. Network Systems.** The WTLN, NLDN, and USPLN systems cover all of the USA and Canada and report lightning strikes to central stations and end-users. This local storm data is available by subscription. Past strike information is archived and accessible upon request.
- 4. Electric Field Mills (EFMs).** This pre-lightning equipment measures the potential gradient (voltage) changes of the earth's electric field and reports changes as thresholds build to lightning breakdown values, in the range of 15 kV. Expect only a narrow (about 5-8 km) reporting range for EFMs.
- 5. Optical Monitors.** These can provide an earlier warning as they detect cloud-to-cloud lightning that typically precedes cloud-to-ground lightning.
- 6. Hybrid Designs.** These monitors use a combination of the other single-technology designs, such as RF, or light or magnetic coincidental recognition. Two or more sources of information may be better than just one.
- 7. Meteorological Subscription Services.** Rent a meteorologist. Off-site professionals make the critical decisions and advise you. This method may blunt claims of negligence if something goes wrong. And some of these providers collect data sets on wind speed, rain, hail, tornado, and other weather conditions. A reliable incoming communications system is vital.

Wi-Fi-enabled equipment is an option used for early detection. However, this equipment could fall short when it comes to the exact location due to connectivity issues, which make it difficult to determine if the system is working or not.

Cloud-based systems provide high-efficiency in-cloud lightning strike detectors combined with advanced analytics (Triangulation) and visualization capabilities to improve lead times for the identification of storm cell growth and development that deliver real-time lightning data.

Advanced lightning detection equipment can quickly identify not only cloud-to-ground strikes but also in-cloud lightning activity. This extra detection is important because although cloud-to-cloud lightning doesn't reach the ground, it can be a precursor to ground strikes and severe weather that pose a significant threat to human life.

Communities should increase their awareness, detection, and warning capabilities and enjoy peace of mind knowing their staff, visitors, and facility are protected when storms threaten.

Lightning Rods²

Lightning rods (and the accompanying protection system) are designed to protect a house or building from a direct lightning strike and in particular, a lightning-initiated fire. Note that lightning protection systems do not prevent lightning from striking the structure, but rather intercept a lightning strike, provide a conductive path for the harmful electrical discharge to follow (the appropriate UL-listed copper or aluminum cable), and disperse the energy safely into the ground (grounding network). It's very important that these components be properly connected (bonded) to minimize the chances of any sparks or side flashes.

While lightning rods help protect a structure from a direct lightning strike, a complete lightning protection system is needed to help prevent harmful electrical surges and possible fires caused by lightning entering a structure via wires and pipes. A complete system also includes electrical surge protection devices for incoming power, data, and communications lines; and surge protection devices for vulnerable appliances. Lightning protection may also be needed for gas piping.

Any lightning protection system should follow the national safety standards and requirements of the Lightning Protection Institute, National Fire Protection Association, and Underwriters Laboratories.

The [National Lightning Safety Council](#) has additional resources to promote lightning safety through education and awareness.

² [National Weather Service – Lightning Rods](#)