

3. Guidelines for Lightning Safety

As noted previously, a chain of command and designated decision-maker should be established for each organized practice and competition.

Recognition:

Coaches, certified athletic trainers, athletes and administrators should be educated regarding the signs indicating thunderstorm development. Since the average distance between successive lightning flashes is approximately 2-3 miles, anytime that lightning can be seen or thunder heard, the risk is already present. Weather can be monitored using the following methods:

- **Monitor Weather Patterns** — Be aware of potential thunderstorms by monitoring local weather forecasts the day before and morning of the practice or competition, and by scanning the sky for signs of potential thunderstorm activity.
- **Flash to Bang** — This method is used to assess how far away lightning is striking. It is determined by counting the number of seconds it takes to hear a clap of thunder after witnessing a flash of lightning. The number of seconds is then divided by five to get the distance, in miles, to the lightning flash. Generally a 30-second or less flash-to-bang count suggests removal of the athletes from the field to a safe shelter is advisable.
- **National Weather Service (NWS)** — Weather can also be monitored using small, portable weather radios from the NWS. The NWS uses a system of severe storm watches and warnings. A watch indicates conditions are favorable for severe weather to develop in an area; a warning indicates severe weather has been reported in an area and for everyone to take proper precautions.

Management:

- **Evacuation** — If lightning is imminent or a thunderstorm is approaching, all personnel, athletes and spectators should evacuate to available safe structures or shelters. A list of the closest safe structures should be announced and displayed on placards at all athletic venues.
- **Thirty-minute rule** — Once lightning has been recognized, it is recommended to wait at least 30 minutes after the last flash of lightning is witnessed or thunder is heard. Given the average rates of thunderstorm travel, the storm should move 10-12 miles away from the area. This significantly reduces the risk of local lightning flashes. **Any subsequent lightning or thunder after the beginning of the 30-minute count should reset the clock and another count should begin.**

Prevention:

In order to prevent lightning-related injuries, it is important to formulate and implement a proactive, comprehensive lightning emergency plan. The plan should include:

- Advance planning
- A systematic approach for monitoring local weather conditions
- Education of staff to recognize signs of nearby lightning activity
- Criteria for suspension and resumption of play
- Evacuation plan including nearby safe shelters
- Periodic review and practice of the plan by appropriate high school personnel

More on Lightning Safety

Significance:

Lightning is one of the most consistent and underrated causes of weather-related deaths or injury in the United States. According to the National Severe Storms Laboratory, approximately 100 fatalities and hundreds more injuries requiring medical attention occur in the United States each year. Lightning-related injuries are of particular concern during the late spring and summer months, and during daytime hours. Nearly all lightning-related injuries occur between the months of May and September, and the greatest number of lightning casualties occurs between the hours of 10 a.m. and 7 p.m., with the greatest risk concentrated between 2 p.m. and 6 p.m. Therefore, the risk of lightning-related injuries appear to be of greatest concern during some of the most active periods for outdoor scholastic activities.



Establishing a Lightning Safety Plan

A thorough, documented lightning safety plan is the most effective way for high schools to prevent lightning-related casualties in their athletic programs. The plan should include advanced planning, a systematic plan for monitoring weather, education on lightning awareness, criteria for suspension and resumption of activity, and an evacuation plan. Moreover, the information included in the plan must be disseminated to the correct, qualified personnel and practiced on a routine basis.

Advance Planning

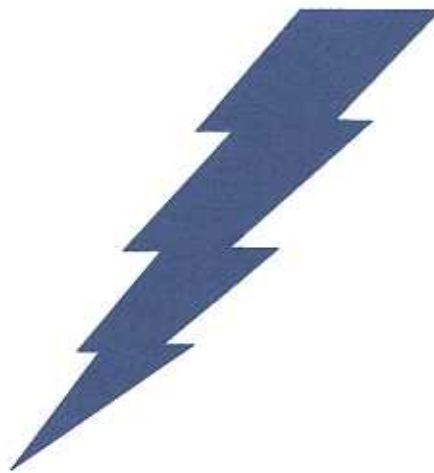
In advance of the activity, a documented plan should be in place and the persons in position of responsibility for monitoring weather activity and deciding when to suspend activity should be identified. Responsible persons must be intimately familiar with all aspects of the lightning policy. In the days prior to an event, it is also important to be aware of the potential for thunderstorm activity through early monitoring of local weather forecasts. In some areas and seasons, characteristic patterns of thunderstorm activity may be noted and should be considered.

Systematic Plan for Monitoring Weather

A person should be designated prior to the practice or event to monitor the weather and notify the person in authority to initiate the evacuation process when appropriate. This person is responsible for monitoring local weather forecasts and scanning the sky for signs of potentially dangerous local thunderstorms. Ideally, this should not be a coach or an official, as they may get so caught up in the game or activity that they fail to adequately monitor weather activity. To assist with weather monitoring, small, portable weather radios from the NOAA and the NWS, and the Weather Channel provide good information on general storm movement and strength. This general information should be combined with specific local weather patterns witnessed while scanning the sky to provide the person in authority with adequate information to determine the safety for its athletic participants.

Education on Lightning Danger

Coaches, athletic trainers, officials, administrators, as well as athletes, should be educated regarding the signs indicating nearby thunderstorm development. Generally speaking, it is felt that anytime that lightning can be seen, or thunder heard, risk is already present. Assessing how far away lightning is striking can be accomplished utilizing the flash-to-bang method. The flash-to-bang method is derived from the fact that light travels significantly faster than sound. Light travels approximately 186,000 miles/second, and sound travels approximately 740 miles/hour, which translates to a speed of one mile every five seconds. The flash-to-bang method is used by counting the number of seconds it takes to hear the clap of thunder after witnessing a flash of lightning. Divide the number of seconds by five to get the distance, in miles, to the lightning flash. For example, if the designated weather monitor counts to 30 between the time he witnessed the lightning flash to the time he hears the thunder, the lightning flash occurred approximately six miles from the weather monitor's position ($30\text{sec} \times 1\text{mile}/5\text{sec} = 6\text{miles}$)



Criteria for Suspension and Resumption of Activity

A 30-second flash-to-bang count corresponds to a distance of six miles, which should provide ample opportunity to remove any athletes from the playing field, and get them into a safe shelter.

After the suspension, the plan should include strict, documented criteria for the resumption of activities. It is recommended to wait at least 30 minutes after the last flash of lightning is witnessed or thunder is heard. **Any subsequent lightning or thunder after the beginning of the 30-minute count should reset the clock and another count should begin.** The combination of the 30-second flash-to-bang count to suspend activity and the 30-minute delay after the last lightning flash to resume activity is commonly referred to as the "30-30 Rule."

Evacuation Plan

All personnel, athletes and spectators should be clearly informed of available safe structures or shelters in the event a thunderstorm approaches. A list of the closest safe structures should be announced and displayed on placards at all athletic venues. The person in authority must be aware of the amount of time it takes to get to each structure and the number of persons each structure can safely hold. For large events, time needed for evacuation is increased and there must be a method, (i.e., announcement over loud speaker) for communicating the need for evacuation and directing both athletes and spectators to the appropriate safe shelters.

Safe Structures: The most ideal safe structure is a fully enclosed, substantial building with plumbing, electrical wiring and telephone service, which aids in grounding the structure. A fully enclosed automobile with a hard metal roof and rolled up windows is also a reasonable choice. School buses are an excellent lightning shelter that can be utilized for large groups of people. However, it is important to avoid contact with any metal while inside the vehicle.

Avoid using shower facilities for safe shelter and do not use showers or plumbing facilities during a thunderstorm as the current from a local lightning strike can enter the building via the plumb-

ing pipelines or electrical connections. It is also considered unsafe to stand near utilities, use corded telephones or headsets during a thunderstorm, due to the danger of electrical current traveling through the telephone line. Cellular and cordless telephones are considered reasonably safe, and can be used to summon help during a thunderstorm.

When caught in a thunderstorm without availability or time to reach safe structures, you can minimize the risk of lightning-related injury by following a few basic guidelines:

- Avoid being the highest object. Seek a thick grove of small trees or bushes surrounded by taller trees or a dry ditch.
- Avoid contact with anything that would be attractive to lightning. Stay away from freestanding trees, poles, antennas, towers, bleachers, baseball dugouts, metal fences, standing pools of water and golf carts.
- Crouch down with legs together, the weight on the balls of the feet, arms wrapped around knees, and head down with ears covered.

Resources:

- Bennett B. A model lightning safety policy for athletics. *J Athl Train.* 1997;32:251-253.
- Holle R, Lopez R, Howard K, Vavrek J, Allsopp J. Safety in the presence of lightning. *Semin Neuro.* 1995;14:375-380.
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- NCAA. Guide Line 1d - Lightning Safety. In: Halpin T, Dick R, eds. *NCAA Sports Medicine Handbook.* Indianapolis, IN: NCAA; 1999.
- NLSI. Multi-Agency Recommendations for Lightning Safety. American Meteorological Society Conference. 1998;Phoenix, Arizona.
- Vavrek I, Holle R, Allsopp J. Flash to Bang. *The Earth Scientist.* 1993;X:3-8.
- Walsh KM, Bennett B, Cooper MA, Holle RL, Kithil R, Lopez RE. National Athletic Trainers' Association Position Statement: Lightning Safety for Athletics and Recreation. *Journal of Athletic Training.* 2000; 35(4): 471-477

For more detailed information and a complete list of references, please see:

Zinder, S.M. and Shultz, S.J. Lightning Safety. National Federation of State High School Associations Resource Document. <http://www.nfhs.org>