

State of Nevada
Division of Industrial Relations
Mine Safety and Training Section

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CONTACT SAFETY PROGRAM

MAY 2006

LIGHTNING DANGER, INJURIES AND TREATMENT



- ✦ Lightning causes more deaths in an average year than all other meteorological events combined, including floods, hurricanes, and tornadoes.
- ✦ Lightning is most commonly associated with thunderstorms. However, any phenomenon that increases energy can provoke lightning. These sources can be volcanic eruptions, snowstorms, sandstorms, rocket launches and nuclear weapons tests.
- ✦ The most common form of lightning is "streak lightning" visualized from cloud to ground. Streak, lightning can be observed cloud to cloud in addition to "sheet lightning" a shapeless flash between clouds.
- ✦ There are four modes of contact with lightning; direct strike, splash phenomenon, step potential, and flashover potential.

Direct strike, as the name implies, is a direct lightning contact to the body, traveling through the body to the ground.



Splash phenomenon occurs when lightning strikes another object and then splashes over to another object or person. Splash potential is the result of the human standing within the potential of the electrical current which has struck the ground. The ground current potential is greater near the strike point, however with less spread apart the current will travel through the body, leg to leg, because of lower resistance than the ground path. Flashover Phenomenon occurs as the high frequency current travels on the outside of the body, water soaked clothes, sweat and then goes to ground.

Injuries from lightning can be Blunt Trauma, Neurologic, Cardiac, Skin, Muscle and Bone Ophthalmologic (eye) and Otologic (hearing). The majority of lethal injuries caused by lightning stem from cardiopulmonary arrest. Rapid triage, first Aid ABC's, CPR, evacuation and transport as needed. Patients must be resuscitated vigorously. Approximately 70%--72% of victims lose consciousness with 85% experiencing retrograde amnesia.

Being the highest point on a mountain, ridge, or a boat on a lake is the greatest risk. Taking shelter under the only tree in open space is also dangerous. Automobiles appear to be safe because the electrical energy path travels around the outside of the vehicle body before going to ground.

As much as 10,000 to 200,000 amperes of current may pass in a 0.07 millisecond lightning strike. The air around the lightning bolt can be as much as 50,000 degree Fahrenheit! If caught in a storm, in the open, carrying objects or tools, drop your tools and seek cover or refuge. Cease boating or swimming during electrical storms.



Lightning Safety On The Job

- ***Some workers are at greater risk than others***

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

- Logging
- Explosives handling or storage
- Heavy equipment operation
- Plumbing and pipefitting
- Construction and building maintenance
- Farming and field labor
- Telecommunications field repair
- Power utility field rep air

- ***When thunderstorms threaten, don't start anything you can't quickly stop.***

Pay attention to the daily forecasts so you know what to expect during the day. Also pay attention to early signs of thunderstorms: high winds, dark clouds, rain, distant thunder or lightning. At this point, do not start any new task that you can't quickly stop.



- ***Know your company's lightning safety warning program***

Businesses that have high risk functions – such as explosives storage or field repairs during severe weather – should have a formal lightning warning policy that meets these two basic requirements:

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

- ***Assess your lightning risk and take precautionary action***

During thunderstorms, no place outside is safe. But you can minimize your risk by assessing the lightning threat and taking the appropriate actions. Count the number of seconds from when you see the lightning flash until you hear the thunder. If you count 30 seconds or less you are in immediate danger. Stop what you're doing and seek safety in a substantial building. If a substantial building is not available, a metal-topped vehicle with the windows up is your next best choice.

- ***Objects and equipment to avoid during thunderstorms***

Stay off of and away from anything tall or high, including rooftops, scaffolding, utility poles, ladders, trees, and large equipment such as bulldozers, cranes, backhoes, track loaders, and tractors.

Do not touch materials or surfaces that can conduct electricity, including metal scaffolding, metal equipment, utility lines, water, water pipes, and plumbing.

Leave areas with explosives, munitions or fuel.

- ***If a co-worker is struck by lightning***

The victim does not carry any electrical charge, call 9-1-1 or your local Emergency Management Services phone number. If the victim's heart stopped or they stopped breathing, immediately administer CPR.

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QUIZ

1. What is the temperature generated by a lightning bolt? _____
(a) 10,000 degrees (b) 5,000 degrees (c) 500,000 degrees (d) 50,000 degrees
2. Name at least four types of injuries lightning can cause.
(1) _____ (3) _____
(2) _____ (4) _____
3. What is a Ophthalmologic injury? _____

4. Name the four modes of lightning strikes.
(1) _____ (3) _____
(2) _____ (4) _____
5. Lightning is most commonly associated with volcanic eruptions. () True () False
6. 85% of lightning strike victims lose consciousness. () True () False
7. Sheet lightning is observed from cloud to ground. () True () False
8. Their is as much as _____ amperes in a flash of lightning.
(a) 5,000 (B) 3,000 (C) 300,000 (D) 200 (E) 200,000
9. First Aid CPR should be vigorous. () True () False
10. What is the most common form of lightning? _____

Employee: _____

Name of Mine: _____

Company Name: _____

Address: _____

City: _____ State: _____ Zip Code _____



Joy Mace Photo

Nice view.

Nice distance.

Each year, **67** people on average are killed in the United States by lightning.

That's more than the average of **65** deaths per year caused by tornadoes and the average of **16** deaths per year caused by hurricanes.

Play it safe when lightning strikes.

If you can hear thunder, you are within striking distance.

SEEK SAFE SHELTER IMMEDIATELY!

Lightning Kills.

Play It Safe!

www.lightningsafety.noaa.gov



Kevin Ambrose Photo

Nice view.

Not so nice distance.

LIGHTNING KILLS,
SO BE CAREFULL AND BE AWARE
TO STAY SAFE.



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