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### **What Is Lightning**

As the ice particles within a cloud (called hydrometeors) grow and interact, they collide, fracture and break apart. It is thought that the smaller particles tend to acquire positive charge, while the larger particles acquire more negative charge. These particles tend to separate under the influences of updrafts and gravity until the upper portion of the cloud acquires a net positive charge and the lower portion of the cloud becomes negatively charged. This separation of charge produces enormous electrical potential both within the cloud and between the cloud and ground. This can amount to millions of volts, and eventually the electrical resistance in the air breaks down and a flash begins. Lightning, then, is an electrical discharge between positive and negative regions of a thunderstorm.

An average bolt of lightning carries a current of up to 300 kiloamperes, has a potential difference up to 1 gigavolt (a thousand million volts), lasts for hundreds of milliseconds, and dissipates enough energy to light a 100 watt lightbulb for up to 95 years.



Nearly 2000 persons per year in the world are injured by lightning strikes, and between 25 to 33 % of those struck die. Lightning injuries result from three factors: electrical damage, intense heat, and the mechanical energy which these generate. While sudden death is common because of the huge voltage of a lightning strike, survivors often fare better than victims of other electrical injuries caused by a more prolonged application of lesser voltage.

### **Facts about Lightning**

- A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit in a split second. This is about five times hotter than the surface of the sun.
- Of all common trees the most frequently struck is the Oak.
- The odds of an average person living in the USA being struck by lightning once in his lifetime has been estimated to be 1:280,000
- The odds of having a friend or family member struck by lightning in the USA in a lifetime has been estimated to 1:3000
- The saying "lightning never strikes twice in the same place" is false.
- The United States is home to "Lightning Alley", a group of states in the American Southeast that collectively see more lightning strikes per year than any other place in the US. The most notable state in Lightning Alley is Florida.
- Although commonly associated with thunderstorms, lightning strikes can occur on any day, even in the absence of clouds.



### **Estimating distance of a lightning strike:**

The flash of a lightning strike and resulting strike and resulting thunder occur at roughly the same time. But light travels at 300,000 kilometers in a second, almost a million times the speed of sound. Sound travels at the slower speed of 330 m/s in the same time. So the flash of lightning is seen before the thunder is heard. By counting the seconds between the flash and the thunder and by dividing by 5, you can estimate the distance in miles. A table is available on page 6.

### **The six most common dangerous activities associated with lightning strikes, in order, are:**

- Work or play in open fields
- Boating, fishing, and swimming.
- Working on heavy farm or road equipment.
- Playing golf.
- Talking on the telephone.
- Repairing or using electrical appliances.

If caught in the open during a strike and the hair on your head or neck begins to stand on end (this really happens) go inside the nearest building. If no shelter is available, crouch down immediately in the lowest possible spot and roll up in a ball with feet on the ground.

**(DO NOT LIE DOWN.)**

### **Treatment:**

- Check breathing and pulse.
- **TREAT APPARENTLY DEAD FIRST.**
- Perform mouth-to-mouth resuscitation.
- Apply cardiopulmonary resuscitation.



### **The 30-30 Rule**

Use the 30-30 rule where visibility is good and there is nothing obstructing your view of the thunderstorm. When you see lightning, count the time until you hear thunder. If that time is 30 seconds or less, the thunderstorm is within 6 miles of you and is dangerous. Seek shelter immediately. The threat of lightning continues for much longer period than most people realize. Wait at least 30 minutes after the last clap of thunder before leaving shelter. Don't be fooled by sunshine or blue sky! If it is cloudy or objects are obscuring your vision, get inside immediately. It is always safer to take precautions than to wait.

### **Outdoor Activities: Minimize the Risk of Being Struck**

Most lightning deaths and injuries in the United States occur during the summer months when the combination of lightning and outdoor summertime activities reaches a peak. During the summer, people take advantage of the warm weather to enjoy a multitude of outdoor recreational activities. Unfortunately, those outdoor recreational activities can put them at greater risk of being struck by lightning. People involved in activities such as boating, swimming, fishing, bicycling, golfing, jogging, walking, hiking, camping, or working out of doors all need to take the appropriate actions in a timely manner when thunderstorms approach. Where organized sports activities take place, coaches, umpires, referees, or camp counselors must protect the safety of the participants by stopping the activities sooner, so that the participants and spectators can get to a safe place before the lightning threat becomes significant. To reduce the threat of death or injury, those in charge of organized outdoor activities should develop and follow a plan to keep participants and spectators safe from Lightning.



## The Lightning Hazard To People

Taking into account the nature of the single-victim event, it seems most appropriate to provide education to the public so that direct responsibility for personal safety from the lightning hazard is taken by each individual. The problem is compounded by the fact that many people experience and survive a close lightning strike every year. The event may have been while safely inside a building or a vehicle, or outside in a vulnerable situation. These experiences also lead to a tendency to take chances. Since all lightning strikes can kill a person, it can be stated that:

***“Lightning is the most dangerous and frequently-encountered weather hazard that most people experience each year.”***



### LIGHTNING DISTANCE/TIME CHART

Time(sec)	Ft Away	Miles Away
1	1116	0.2
2	2232	0.4
3	3348	0.6
4	4464	0.8
5	5580	1.1
6	6696	1.3
7	7812	1.5
8	8928	1.7
9	10044	1.9
10	11160	2.1
11	12276	2.3
12	13392	2.5
13	14508	2.7
14	15624	3.0
15	16740	3.2
16	17856	3.4
17	18792	3.6
18	20088	3.8
19	21204	4.0
20	22320	4.2
21	23436	4.4
22	24552	4.7
23	25668	4.9
24	26784	5.1
25	27900	5.3
26	29016	5.5
27	30132	5.7
28	31248	5.9
29	32364	6.1
30	33480	6.3

Time(sec)	Ft Away	Miles Away
31	34596	6.6
32	35712	6.8
33	36828	7.0
34	37944	7.2
35	39060	7.4
36	40176	7.6
37	41292	7.8
38	42408	8.0
39	43524	8.2
40	44640	8.5
41	45756	8.7
42	46872	8.9
43	47988	9.1
44	49104	9.3
45	50220	9.5
46	51336	9.7
47	52452	9.9
48	53568	10.1
49	54684	10.4
50	55800	10.6
51	56916	10.8
52	58032	11.0
53	59148	11.2
54	60264	11.4
55	61380	11.6
56	62496	11.8
57	63612	12.0
58	64728	12.3
59	65844	12.5
60	66960	12.7