

**LIGHTNING DATA CENTER MINUTES**  
**March 8, 2013**  
**ST. ANTHONY HOSPITAL WEST, LAKEWOOD, CO**  
**On the Web at: [www.stanthonyhosp.org/ldc](http://www.stanthonyhosp.org/ldc)**

Monthly Quote: “In the beginning there was silence and darkness, all across the earth. Then came the wind, and a hole in the sky. Thunder and lightning keep crushing down, hit the earth and split the ground, fire burning high in the sky.” From a song by Manowar, titled “The God’s Made of Heavy Metal”.

1. The meeting began at 12:05 PM and adjourned at 1:05 PM. Members Present: Clark, Claus, Elder, Schoessen, and Collier. Clark moderated the meeting.
2. From our colleagues on the Yahoo Lightning Protection Group: The University of Wisconsin-Madison will be offering the following spring course: “Analysis of Transients in Power Systems (PDH/CEU: 30/3.0) on May 13-17, 2013 in Madison, Wisconsin. This course will provide beginning and intermediate students a good hands-on experience on the analysis and modeling of power system transients. The course is based on the usage of EMTP-RV for demonstrating concepts and teaching through practical problem cases. Users of any EMTP-type program will benefit by increasing their knowledge of transient analysis and simulation.

The course faculty includes Jean Mahseredjian, Ecole Polytechnique, Montreal, Quebec, Canada; Doug Mader, Entergy Services, New Orleans, Louisiana; and Chris DeMarco, University of Wisconsin-Madison.

Enrollment is limited. Course information and on-line enrollment are available at: <http://epd.engr.wisc.edu/webN484>”

3. Also from the Yahoo Lightning Protection Group: The 8<sup>th</sup> Asia-Pacific International Conference on Lightning will be held June 36-28, 2013 in Seoul, South Korea. The deadline for preliminary paper submission has been extended to March 15, 2013. Their main website is: [www.apl2013.org](http://www.apl2013.org).

4. Clark presented an article from the August 2012 edition of Scientific American, titled: “Deadly Rays from Clouds”, which discussed gamma rays in the atmosphere produced by thunderstorms. The mechanism for their formation is not entirely understood. Recent measurements by an Italian spacecraft show the energy spectrum associated with these gamma rays is upwards of 100 MeV, which is considerably higher than current theories suggest. To read the article, you will need to access it through your library’s online electronic database.
5. Clark also presented a question posed to the Yahoo Lightning Protection Group. A meteorologist in Canada wanted to know about the validity of the so-called “Cone of Protection”, as it relates to a boat. According to the website [www.boatsafe.com](http://www.boatsafe.com), the crew would be safe during a thunderstorm inside the 45-degree “cone of protection” (See the link below). The meteorologist wanted to know if this was true. According to Mr. Mousa, the “cone of protection” applies only to structures and not personnel. Therefore, personnel should take shelter inside the cabin, and stay away from windows, plumbing, wiring, and appliances. Finally, Mr. Mousa feels the website is trying to genuinely educate people about lightning safety, but has made an inadvertent error in deciding the cone of protection concept applies to personnel.
6. Rich Collier told us the launch tower for the Space Shuttle has a lightning rod on top of the launch tower. Two 1000-foot catenary wires ran down to the ground. The purpose of the wires was to attract lightning and prevent the tower from being struck. Cameras were positioned near the wires and captured photos of the lightning strikes. In one instance, the lightning channel appeared to approach the catenary wire, then made a u-shaped turn around the wire and proceeded to strike the tower. Rich thought the polarity of the flash by the catenary wire and the wire itself were the same, which would cause the lightning channel to be diverted around the wire.
7. In a previous meeting, we had a woman who was struck by lightning while she was driving her Chevy HHC. Rich Collier had expressed curiosity about the holes, given their large size (nickel and quarter-sized). Steve Clark contacted Chevrolet about the metal in the car. The Chevy people say the doors are made of ordinary mild steel and the pillars and intrusion beams are made of a mixture of sandwiched layers of high-strength steel. Rich wanted to know where in the car the holes are and also which side of the car the holes are on – driver or passenger side. He also wanted to know how thick the metal is. Clark will address those questions.

Rich was also interested in the aluminum ice pick discussed in last month's meeting, which has a hollow aluminum handle. It was struck by lightning and had a hole in it about half the diameter of the handle. Here's a photo of the axe. Thanks to John Gookin for sharing this during the February meeting and to Ken Langford for sending this to me.



Paul Schoessen thought the holes in the car could be modeled using physics models such as VORPAL or COMSOL. Paul helped write some of the VORPAL code back when it was a 2-dimensional model. VORPAL has been used to design electronic devices and also to investigate high-energy physics. COMSOL is a multi-physics software package. Some of the different physical simulations that can be performed are electromagnetic studies, computational fluid physics, structural analysis, heat transfer, computer-aided design, plasma physics, and particle tracing. Paul seemed to think the COMSOL package might have a more robust physics package to model a lightning strike.

Clark pointed out a website where an engineer has examined an Airstream-type trailer (1981 Avion Camper Trailer) that was hit by lightning. Photos of the trailer show a hole about the diameter of a pencil. Rich Collier again expressed curiosity, due to the large size of the hole. As noted earlier, Collier's past work in triggered lightning research has found holes in metallic surfaces that are very small – no larger than pinholes, in some cases. He mentioned the triggered lightning work was done in New Mexico at Sandia under the guidance of the U.S. Army. Collier thinks some research reports and possibly photographs, are out there in the public domain.

8. Next meeting: Friday, April 12, 2013 at 11:45 AM at St. Anthony Hospital West. Conference Room TBA. This will be a round table meeting. NOTE: Ken Langford will moderate the February meeting, as I will be out of town.

Respectfully Submitted,

Steven E. Clark, Consulting Meteorologist

### **In Case You Missed It...Lightning Links**

**This is a monthly listing of news, articles, websites, and videos about lightning and allied areas as reported in the media. A headline or description is listed, followed by the link. Please note that some of the links are perishable, which means you'll need to go to the source for the information. Enjoy!**

Wayne County Man Killed by Lightning

<http://www.deseretnews.com/article/865559445/Wayne-County-man-killed-by-lightning.html>

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Lightning Could Spur Headaches, Migraines: Study

[http://www.huffingtonpost.com/2013/01/24/lightning-headache-migraine\\_n\\_2544259.html](http://www.huffingtonpost.com/2013/01/24/lightning-headache-migraine_n_2544259.html)

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Cone of Protection on a Boat?

<http://mail.aol.com/37309-111/aol-6/en-us/Suite.aspx>

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Here's the webpage from [www.boatsafe.com](http://www.boatsafe.com), which discusses the "cone of protection".

<http://boatsafe.com/nauticalknowhow/lightning.htm>

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An Example of the Application of the VORPAL Model. "Computational Modeling of High-Gradient Breakdown Using VORPAL.

<http://www.slac.stanford.edu/grp/ara/HGWorkshop/HighGradient12Jul05.pdf>

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The COMSOL Multiphysics Homepage: <http://www.comsol.com/>

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Simulation and Measurement of Melting Effects on Metal Sheets Caused By Direct Lightning Strikes.

[http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19910023330\\_1991023330.pdf](http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19910023330_1991023330.pdf)

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Here's the website showing the damage and holes in the camper trailer.

<http://www.electrical-forensics.com/LightningDamage/LightningDamage.html>

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