

**REPORT OF THE RF SAFETY COMMITTEE
TO THE
ARRL BOARD OF DIRECTORS**

July 2005

The RF Safety Committee has participated in the following areas over the past six months:

1. RF Safety Committee Activities.
2. Monitoring recent scientific studies regarding RF Safety.
3. Participation in the scientific RF Safety community.
4. Administrative issues.
5. Future Plans.

1 RF Safety Committee Activities

- 1.1 The Committee commented on a letter from a ham who was experiencing “strange feelings” while operating his HF station. He was concerned because he had suffered a seizure about 10 years earlier and had been on medication ever since. He had not had a seizure while on the medication but any feelings out of the ordinary caused him to be concerned. The Committee replied that the very first thing this ham should do is to determine if there are excessive levels of RF in his shack. His assumption that his feelings are related to radio wave transmissions would have to be tied to high RF exposure to be further investigated, particularly considering the medication that he is taking. The Committee also related that scientific studies into the induction of nerve action potentials by incident RF energy have shown that these do not occur at normal exposure levels. Thus, the likelihood of a seizure being potentiated by his ham radio transmissions is extremely low. Following this reply the Committee did not hear from this ham again.
- 1.2 The Committee was asked to aid the ARRL Media Public Relations Manager in understanding a news item about “electrical pollution.” A self-proclaimed scientist claimed to have discovered a mechanism by which RF energy is absorbed into power lines and then is carried into homes and schools where it is retransmitted at the power outlets, exposing the people indoors to unhealthy amounts of energy. Furthermore, she claims to have solved this health hazard by developing a filter that can be plugged in to the outlets to remove the RF energy. She claims to have performed studies of the effects of this filter and discovered cures for people afflicted with multiple sclerosis and diabetes. The Committee had a fun time discussing this but cautioned the Media Public Relations Manager to not respond publicly to this issue.
- 1.3 The Committee responded to the concerns of a ham that had recently received a pacemaker and was concerned about interactions from his ham radio station. Dr. Ross contacted the pacemaker manufacturer and was given their requirements for operation of radios by users of their devices: 10-foot separation from pulse modulated transmitters and 5-foot separation from AM transmitters. The ham was cautioned to discuss these limits with his doctor before operating and Dr. Ross volunteered to be available to answer any technical questions.

2 Monitoring Scientific Studies

- 2.1 The Committee was made aware of a grass-roots effort in South Bend, Indiana to “investigate environmental illnesses caused by electromagnetic fields and chemical emissions.” A group of citizens from across the state presented a petition with 1500 signatures to the county government to attempt to force an investigation. The RF Safety Committee found this to be a reaction of people uninformed about the current state of the science. However, it is indicative of a growing sentiment across the country of people who are blindly accepting the hype that can be found in many “doomsday” style websites. A public relations campaign to educate lay people to what is known about RF Safety may be called for.
- 2.2 A study of cellular telephones in Finland found that 16 newly introduced models from several manufacturers produce exposures that are far below the accepted standards.
- 2.3 The FCC fined an FM radio station in New Mexico for, among other things, exceeding the Maximum Permissible Exposure of their transmissions to the public.
- 2.4 The Committee commented on a news article from Austria where scientists measured changes in the brain waves (EEG) of persons who complain of electrosensitivity when exposed to radio frequency energy. The study appeared to have been very poorly performed and did not discuss the perturbation of the EEG equipment, which measures very small signals from the brain that are on the order of 10 microvolts, by the presence of an electromagnetic field.
- 2.5 The Committee was asked to provide explanations to the ARRL Senior News Editor about a story from the BBC regarding the finding of an Italian judge that the cardinal and the priest in charge of the Vatican’s AM broadcast radio station was guilty of endangering the public with electromagnetic pollution. The case stemmed from the claim that people in the neighborhood of the Vatican antennas had a 6-fold increase in leukemia cases. Further investigation of the facts by the Committee indicated that the Italian government had convened an international expert panel to study this claim and they had reanalyzed the statistics to find that the original claim was incorrect. In reality, when leukemia cases were divided evenly over distance from the antennas, the rate of the disease was equal to the rates of leukemia in the rest of Rome. The Committee opined that this court decision would be reversed under appeal if the actual scientific facts were presented.

3 Participation in the Scientific RF Safety Community.

- 3.1 Dr. Lapin continues to serve on the IEEE Committee on Man and Radiation (COMAR).
- 3.2 Mr. Hare and Dr. Guy continue to serve on the IEEE Standards Coordinating Committee 28 on Non-Ionizing Radiation, which develops the standards for human exposure to RF energy. Mr. Hare maintains a list server for communications among members of this committee, and occasionally cross-pollinates pertinent issues between the RFSC and SCC-28 list servers.

- 3.3 Mr. Hare presented the Committee with an update to the main IEEE safety standard, IEEE C95.1b 2004, "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz. Amendment 2: Specific Absorption Rate (SAR) Limits for the Pinna". The latest amendment changed the wording of the exposure limits for the pinna, which is the fleshy part of the ear outside the head. The pinna had previously been included with brain tissue with respect to the limit of electromagnetic energy that it could absorb. This was acknowledged by the standards committee as an oversight that was corrected in this revision of the standard. Now the pinna is considered to be an extremity, like an arm or a leg.
- 3.4 Mr. Hare presented the Committee with the draft of part of a new revision of one section of the IEEE RF Safety Standard, IEEE C95.7D, "Recommended Practice for Radio Frequency Safety Programs, 3 kHz to 300 GHz." The Committee recommended that Mr. Hare cast a vote to "Approve" this revision of the standard.
- 3.5 The Committee was made aware of an issue brewing in the scientific RF safety community whereby Henry Lai, the University of Washington scientist who originally presented the research results that claimed to show that RF from cellular telephone broke DNA strands in rat brains, and Louis Slessin, the publisher and editor of Microwave News, accused one of our RF Safety Committee members, Dr. Guy, of being complicit in the loss of Dr. Lai's research grants. These accusations were published in an editorial in Microwave News. Dr. Guy was highly distressed by this attack and set out to show that it was untrue and that Dr. Lai's research lost funding only because of considerations about the quality his research made at the National Institutes of Health. The Committee expressed its unflagging support of Dr. Guy.
- 3.6 The Committee expressed its sadness at the passing of an RF Safety colleague, Dr. Lou Heynick.
- 3.7 Mr. Hare presented the Committee with a major update to the main IEEE safety standard, IEEE C95.1D 2005, "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz." This is the main standard that last underwent a major update in 1991, a minor revision in 1998, and another minor revision regarding the pinna this year. This is the safety standard that was adopted by the American National Standards Institute, ANSI, and was used to formulate the environmental RF exposure limits in the FCC regulations. The Committee members were asked to review the entire 255-page document to identify any changes that might make it more difficult for hams to comply with the standard. Dr. Guy identified a new section of the standard that deals with induced currents. Previously the RF Safety standards had only considered absorption of RF energy in human tissue. The new revision of the standard added the concept of induced currents in the bodies of people who were standing on the ground, much like currents that are induced in antennas from electromagnetic energy in the air. The revised standard was written from a worst-case point of view, where the assumed induced current was based on a standing person with a perfect connection to ground in an incident vertically polarized plane wave of energy, a highly unlikely occurrence. The Committee decided that the wording of this new section could make it difficult for hams to meet the safety limits without performing highly complicated measurements. The Committee directed Mr. Hare to vote on its behalf to "Approve With Comments" and added the comments that the induced currents listed were only valid under the conditions previously stated. Specifically, the ARRL comments were as follows:

Comment: The ARRL position concurs with the comments of Bill Guy regarding Induced and Contact Currents. We feel that the following changes should be made to the draft C95.1D standard in order to avoid an over-conservative set of limits for Induced and Contact Currents in the MF, HF and low VHF section, 100 kHz to 110 MHz (section 4.2.3, Table 7, Figure 1 and Figure 2).

Suggested Remedy: Add the following Note to Table 7 and Figures 1 and 2:

These limits apply to vertically polarized plane waves incident on a standing person in perfect contact with a perfect ground. If any of these conditions are not met, these limits do not apply.

This statement was designed to prevent the direct implementation of these induced current tables in the FCC Regulations.

4 Administrative Issues

- 4.1 The Committee will be renewing and revising its membership in the coming year to insure that it contains members who wish to actively participate in its deliberations.

5 Future Plans

- 5.1 The committee is considering if there is a need to revise the RF Safety text used in ARRL publications.

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