Doc. #24

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

January 2007

The RF Safety Committee 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.

1 RF Safety Committee Activities

1.1 The committee reviewed new RF Safety questions that had been proposed by the Question Pool Committee for the General exam. Initially, a discussion of the required number of RF safety questions ensued. It was noted that the FCC removed a defined number in its 1999 biennial review that resulted in Report and Order 99-412. Thus, the FCC now trusts the QPC to determine the appropriate number of RF safety questions. After reading over the QPC's proposed questions, a number of examples of poor wording and a couple of outright errors were identified. The committee also noted that the QPC was attempting to remove the question that deals with the relative responsibility of each transmitter at a multi-transmitter site where an RF MPE violation exists. The committee felt that even though the topic is complex and difficult to put into a question, it is an important concept to include on the General exam since many ham repeaters are located at sites with other transmitters. For each question the committee provided explanations of what was wrong and either suggested corrections or the recommendation of removal of the question from the pool. Perry Green, WY1O, represented the committee's comments to the QPC and was able to get most of the corrections incorporated.

1.2 The committee has worked to rewrite the RF Safety text that will appear in the 2008 revision of the ARRL Handbook. The new text benefited from collaboration with the Co-chairman of the IEEE Standards Coordinating Committee who oversaw the recently released RF Safety standard, C95.1-2005, C-K Chou, PhD of Motorola Labs, Mays Swicord, PhD, also of Motorola Labs, Robert Cleveland, PhD, of FCC Office of Engineering and Technology, and Edward Mantiply, PhD, also of FCC OET.

1.3 The committee reviewed a complaint from a woman in Hawaii who was concerned that her dog's irritability was being caused by radiation from her neighbors' ham stations. Her concerns were relayed to Ron Hashiro, AH6RH, who allayed her fears very effectively. The committee decided that no further action was warranted.

1.4 The committee discussed an enforcement action by the FCC against a radio amateur, the first of its kind that any of us had seen. The ham's neighbor had complained to the FCC that the ham antenna was only a few feet from his bedroom window. Of significance, the FCC complaint specifically mentioned that the neighbor was an electrical engineer, which apparently lent more credence to the complaint in the eyes of the FCC. The ham was requested to submit his environmental assessment of his station to the FCC. The

committee was surprised that this situation was not handled personally between the two neighbors, particularly since "a few feet from his bedroom window" sounds like an extreme situation.

1.5 The committee was presented with a letter from a ham who challenged the RF safety implications of an article that had been published in the December 2006 issue of QST. In this article a picture of a ham operating his HF QRP station at a picnic table in close proximity to his portable loop antenna. The letter included calculations using a solenoid equation and a rather high estimate of RF current flow as stated in the article to show that the magnetic field from the sides of the loop exceeded the MPE limits. Two issues arose from this letter: first that this article had never been presented to the RF Safety Committee for review prior to its publication and second that the calculations of MPEs included in the letter did not seem to be accurate. The chairman asked the editor of QST to make sure that all manuscripts submitted for publication that have any potential RF safety issues be presented to the RFSC for review. Members of the committee tried to make sense of the various calculations involved in the near field MPE determinations. Although it was not mentioned in the article, MFJ, the maker of the loop tuner that was being written about, listed MPE tables in their manual, which indicated that the loop antenna was being used safely. The use of a solenoid equation to determine the magnetic fields surrounding a loop antenna ignores RF losses in the tuner and ground effects. Members of the committee are currently in the process of using RF modeling tools such as NEC and FDTD to get a more accurate picture of the near field exposure of this antenna.

1.6 Dr. Siwiak presented the committee with a manuscript of an article that he is writing about indoor antennas for QST. In light of the questions about the loop antenna article, he asked the committee to comment on the RF safety implications presented in his manuscript.

1.7 The committee was once again presented with the suggestion that BPL technology exposes the public to too much RF. Although the RF on the power lines can cause considerable interference to receivers, there is no way that it is going to present excessive exposure to humans. Any argument to the contrary is not only inaccurate but is counterproductive to hams who can emit over 20 million times the power and must still assure the public that they are in no danger.

2 Monitoring Scientific Studies

2.1 The committee discussed an article in *Annals of Neurology* by a research team in Italy that used transcranial magnetic stimulation to look for changes in brain tissue activity when the head is exposed to radio frequency energy. The researchers reported that brain tissue became more excitable when exposed to RF. The committee discussed that such studies of brain activity have been attempted in the past with the result that the RF signal interferes with the very sensitive EEG amplifiers, leading to false results. Since brain activity evoked potentials are on the order of 100 μV, they are easily interfered with. The new study appears to reproduce errors of the past.

2.2 The committee discussed an article in the news that reported an epidemiological study that claimed to show that men using cell phones had lower sperm counts. The biases of this study were clear: rather than comparing results from the entire population, the entire study population consisted of men who were already being seen in infertility clinics. The committee also noted that sperm counts are extremely transitory and do not make for a reliable metric in such a study.

2.3 The committee discussed an article that has appearing in newspapers, entitled "Cell Phones Can Be Dangerous to Your Health." While not a new concept in the news, the latest articles are based on "fact sheets" entitled "EarthTalk," available online from "Emagazine.com" These fact sheets have a poor scientific basis and have become popular with small newspapers that don't have the budget to research such stories themselves. The committee noted that it is important to challenge the presence of such articles in local newspapers to prevent such misinformation from being accepted as fact.

2.4 The committee discussed the latest epidemiological study of cell phone users performed in Denmark. It is the largest study to date, with 420,000 subjects, and the one including the longest exposure periods, with 52,000 of the subjects logging more than 10 years of cell phone use. The study also was able to match cell phone records to the Danish Cancer Registry, which is renown for its completeness and accuracy. Their finding of no association between cell phone use and cancer rates is the strongest to date.

2.5 The committee discussed the report of a new antenna technology ("Isolated Magnetic Dipole") that claims to increase cell phone safety by focusing more energy toward the cell tower. The wording did not resonate well with some committee members, since if the old cell phones are already safe, a new antenna does not make them safer. However, there was interest about how this antenna works and why increased directionality necessarily means that human exposure will be decreased, such as in the case where the head is between the phone and the cell tower.

2.6 The committee discussed an article in a Wisconsin newspaper that reported about vandals climbing a broadcast radio tower. The article mentioned that the vandals might have contracted "radiation poisoning," wording that the committee took exception with.

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 continues 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.

4 Administrative Issues

4.1 The committee is looking for a new member with an expertise that fills our need of responding to hams with pacemakers regarding the safety of their operating.

4.2 The committee was made aware of a new publication by the World Health Organization, entitled "Model Legislation for Electromagnetic Fields Protection." The committee agreed that it would be useful to provide a link on its page of the ARRL web site to this document on the WHO web site.

4.3 Considering the growing need to confirm the RF Safety implications of new antennas, as evidenced by the discussion of the QST article about loop antennas, the committee is discussing the importance of having acceptable modeling tools.

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