

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

July 2001

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 In February, the committee received a message from a ham that was concerned about pictures of unsafe RF practices in QST. He was referring to a picture of someone holding a VHF/UHF beam while operating. The picture in question was of the Arrow II satellite beam, which was designed for portable satellite operation. The committee investigated and found three mentions of this beam with photos in QST issues during the year 2000. Even though the beam is manufactured with an insulated handle and is used with an HT in all of the pictures, and thus is likely to meet RF Safety exposure guidelines, the committee concluded that the potential for unsafe operation exists. For instance, if the same beam is handheld and is driven with a 50-watt radio it is unlikely to meet the exposure limits. Also, the user must be aware that the beam should not be pointed at people when transmitting. The committee recommended to the editor of QST that the captions of any future photographs of this beam include a discussion of its safe use.
- 1.2 The committee responded to an email from a non-ham that was concerned about buying a house next to a ham with several antennas. We explained the RF exposure regulations to her and how every ham has been charged with making sure that the exposure limits are not exceeded. Her fears appeared to be allayed.
- 1.3 The committee responded to an email from a ham that wanted the ARRL to support a repeal of the RF exposure regulation, believing them to be politically motivated. The response to him included the scientific basis of the exposure regulations as well as some of their history. We concluded that since exposure regulations had evolved through the Nixon, Ford, Carter, Reagan, Bush and Clinton administrations, it was unlikely that there was a political basis to them. **Most importantly, the committee affirmed that, in our view, the FCC's RF Exposure Regulations are entirely appropriate and should not be opposed in any way by the amateur radio community.**

- 1.4 The committee received a number of queries from hams about the safety of using medical instruments in RF fields, particularly near a ham shack. Specifically, the questions of the safety of pacemakers and insulin pumps were brought up. Although this is more of an RFI issue than an RF Safety issue, the committee attempted to find answers due to the medical aspect of the instruments. No definitive answers were obtained and the various hams were directed to the FDA website for more information. However, we recognize that this is an important area on which to have information and suggest that additional follow-up be attempted either by RFSC or the RFI committee.
- 1.5 In March, the committee responded to a ham who was interested in the electromagnetic absorption properties of tissue. Dr. Guy provided a reference to data that are commonly used in most modeling studies,
<http://www.brooks.af.mil/AFRL/HED/hedr/reports/dielectric/cover.html>
- 1.6 A ham from California contacted the committee in July after he was asked by one of his neighbors to supply proof that the emissions from the Amateur Radio were not harming them. Mr. Hare performed simulations of the station's antennas and provided the exposure levels at the neighbors' yards. The result was that the worst-case exposure of the neighbors was many times below the allowable limits. The nearest neighbor had contacted the FCC and appeared to be well versed in the terminology of RF Safety. The ham asked Mr. Hare to speak with the neighbor to explain the calculations and, hopefully, allay her fears. The final result is pending.

2 Monitoring Scientific Studies

- 2.1 The reply by Drs. Lapin and Guy on behalf of the ARRL RF Safety Committee to two papers by Prof. Ronold King appearing last fall in IEEE Transactions on Microwave Theory and Techniques was published in the April 2001 issue of IEEE T-MTT. Rebuttal comments by Prof. King indicated that he was not convinced by our arguments, but now the readership will be able to see all of the facts and judge for themselves.
- 2.2 In March, the committee learned of a new RF crowd-control weapon being developed by the Department of Defense. The basis of the device is the very high frequency (probably in the 100 GHz range) that has very shallow penetration in the body. With most of the RF being absorbed just below the skin (about 1/16") the heat generated causes a very uncomfortable sensation that can effectively disable members of an unruly crowd. Although this type of device would likely violate the safe exposure limits, its primary purpose is to elicit a biological response. The committee agreed that the device would most likely not cause permanent damage, except perhaps for direct exposure to the eye, and that it is far preferable to the crowd-control alternatives currently in use, such as rubber bullets and tear-gas. Also, the committee agreed that the opinions of scientists who claimed that this could lead to cancer were entirely unfounded. Dr. Lapin devoted one of his monthly column articles to this topic, which elicited a large email response.

- 2.3 In March, a British epidemiologist reported that a study of people living along power lines in England resulted in a slightly increased incidence of leukemia among children. In addition, the group, which was organized by the British National Radiological Protection Board, proposed a mechanism that involved ions in air formed by the electromagnetic fields reacting with biological tissue to cause the disease. The committee discussed this report and concluded that the British epidemiological study is just one more among many, the majority of which have not shown an association between proximity to power lines and disease. The committee also considered the confounding factor of herbicides that have been commonly used to control weeds below power lines. Additionally, the committee believed the NRPB suggested mechanism to be far-fetched and unlikely.
- 2.4 In April, the Journal of Occupational Medicine reported a study linking some occupations to cancer. Of interest to the committee is this significant association: "...electrical service, and electrical and electronic equipment were significantly associated with an increased risk of brain cancer in this study...the interpretation of the observed association, however is still uncertain. It is currently unknown whether the increased risk of brain cancer observed among electrical workers is linked to magnetic or electrical fields or exposure to other hazards such as organic solvents, metal fumes or polychlorinated biphenyls..."
- 2.5 A new set of liability lawsuits against the cellular telephone industry was brought by a group of lawyers led by Peter Angelos, the Baltimore lawyer who represented the State of Maryland against the tobacco companies. The association between Angelos and George Carlo, the ousted organizer of the CTIA research program, became clear late last year. The CTIA correctly claims that there is no more scientific basis for these lawsuits than there was for past suits that were thrown out.
- 2.6 In June it was announced that Nokia, Ericsson and Motorola each have patented devices they say could shield wireless handset users from any supposed RF health hazards. This is enough for some lawyers handling such cases globally to say the manufacturers recognize there could be some ill effects caused by wireless usage. This was the topic of an Op Ed article by Dr. Lapin that appeared in QST in May 1999. Apparently in an attempt to oversell their inventions to the patent office, these highly competitive companies listed RF Safety as a benefit, even though no danger has been shown to exist.
- 2.7 In June, the news reported that a study of cellular telephone users in Sweden resulted in an increased incidence of brain tumors. This is in direct opposition to two epidemiological studies of cellular telephone users that were published in December 2000, one by the National Cancer Institute and the other that was funded by Wireless Technology Research, plus another study that was performed in Denmark. All of the earlier studies had found no statistical link between cell phone use and brain cancer. The committee, upon examining the report from Sweden, concluded that the type of tumor, Acoustic Neuroma, is not technically a brain tumor but rather one that is wrapped around the acoustic nerve outside of the brain, and is easily removed. Furthermore, it is not clear that an association actually exists since the other studies did not show this growth in excess among their sample groups.
- 3 Participation in the Scientific RF Safety Community.
- 3.1 Dr. Lapin continues writing a monthly column about RF Safety for the ARRL Web Page.

The titles for the first half of the year are: "The Pendulum Swings," "Athermal Bioeffects," "The Military's New RF Weapon," and "What About Federal Preemption of State and Local Laws?" The publication of each article on the ARRL Web continues to elicit a fair number of mostly favorable responses from hams.

- 3.2 A small furor arose in the week following publication of "What About Federal Preemption of State and Local Laws?" on the ARRL Web. The article discussed a bill that was proposed in the Missouri House of Representatives, HB 999, which would greatly complicate the zoning procedures for antenna structures. The stated reason for this bill was the inherent danger of RF transmissions to children and a response in the RF Safety column was warranted. As a result of this, the bill's primary author, Representative Denny Merideth, has stated the following:

In the event a new bill is filed it will incorporate a few changes. One change will be to eliminate unnecessary language in the first paragraph dealing with exposure and intent. It is a bit vague and does not add anything positive to the legislation. A second change will incorporate language that will clarify that the bill will not apply to amateur radio operations.

Additionally, legislation is to be introduced as coordinated with American Radio Relay League to improve protections for Amateur Radio Operators in the state. This suggestion comes as a direct result of the inputs received by many member of the amateur radio community and one that has a lot of merit.

- 3.3 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.
- 3.4 Dr. Guy was mentioned in a February Washington Post review article about RF bioeffects, though he claims that his part in the B-2 stealth bomber design was overstated:

Countless laboratory studies over the past 10 years have found that cellular phone radiation does not cause cell damage. These, backed by the epidemiological studies, form the basis of the industry claims that cellular phones are safe.

But according to Bill Guy of the University of Washington, the radiation in those laboratory tests may not have penetrated the cells as it would penetrate the brain in real life. Guy was instrumental in developing the B-2 stealth bomber, an airplane that can evade detection by radar (another form of radiation). In the lab, it seems, scientists are confronted with stealth petri dishes that distribute radiation in a way that produces "cold" and "hot" spots. Undamaged cells in all those experiments may have been in "cold" spots not exposed to radiation, Guy says.

- 3.5 Dr. Gold has worked with local amateurs to help them understand and comply with the FCC RF Safety guidelines.

- 3.6 Dr. Siwiak responded to two hams directly on RF exposure from nearby antennas. The most notable and memorable was an exchange with David Hulatt G4WFQ on near fields of 1 m diameter loops -- he said that he would join ARRL as a result of the service he got.

4 Administrative Issues

- 4.1 Mr. Hare continues to administer the RF Safety committee email reflector, which handles correspondence between committee members. Other ARRL staff members and some former committee members monitor traffic over the reflector and we occasionally receive helpful comments from them. We have the capability to review things that were discussed in the past and search for keywords. In the first half of this year, approximately 150 messages were posted on the RFSC reflector.
- 4.2 The RFSC is considering adding new committee members. Several individuals have been identified and added to the RFSC email reflector. Based on their participation in RF safety discussions, the committee will vote on whether to propose them for inclusion and then submit their names to the ARRL President for consideration.
- 4.3 Dr. Lapin has contacted RF Safety experts from RAC and RSGB to invite them to participate in ARRL RFSC discussions. So far, there has been no response.
- 4.4 Dr. Lapin was appointed to the FCC Technological Advisory Council, representing ARRL RFSC on that body. He attended the first meeting at the FCC Portals Building in Washington, DC on June 13, 2001.

5 Future Plans

- 5.1 The committee continues to consider restructuring of the RF Safety text that appears in all ARRL publications.
- 5.2 The committee will continue to monitor the NCI epidemiological study of radio amateurs, and help the investigators maintain the highest level of accuracy. Dr. Cantor, the study's principal investigator, recently reported "the study is progressing, but at a slower pace than anticipated in my last note to you." Also, Dr. Cantor has invited Dr. Lapin to visit his laboratory at the National Cancer Institute the next time Dr. Lapin travels to Washington, D.C. for an FCC TAC meeting.

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The ARRL RF Safety Committee

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