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

July 2022, Rev A

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

1. RF Safety Committee Activities.
2. Monitoring current events and scientific studies regarding RF Safety.
3. Participation in the scientific RF Safety community.
4. Administrative issues.

1 RF Safety Committee Activities

1.1 The subset of the Committee, that includes Dr. Lapin, Dr. Siwiak, Mr. Tell and Mr. Butcher, which has been meeting regularly with a group from the RSGB to discuss methods of conforming with RF exposure regulations, was recognized by the RSGB with their Founder's Trophy for 2021. The British members of the group were presented their awards at the RSGB annual meeting in April. The awards for the ARRL members of the group were presented at the Dayton Hamvention by the RSGB President, Stewart Bryant, G3YSX, and were accepted by Dr. Lapin on behalf of the other RFSC members.

1.2 Dr. Lapin completed an entirely new RF Safety chapter for the 2022 edition of the ARRL Handbook. Following review by the Committee the new text was accepted by the editor and will appear in the Handbook this fall.

1.3 The Committee is starting to consider the rewrite of the RF Safety section of the next ARRL publication, the ARRL Antenna Book. As part of our overall plan, the discussion of RF Safety in Antenna Book will build on the text that was recently written for the Handbook. RF Safety in the Antenna Book will be more technical, with discussions of near-field antenna modeling techniques to determine exposure from non-standard antennas.

1.4 The Committee has been rewriting the FCC publication OET Bulletin 65 Supplement B, **Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields**, ***Additional Information for Amateur Radio Stations.*** The new document is currently 118 pages long and is being reviewed in detail by FCC staff. Publication of the document must be preceded by several stages of review by various government entities.

1.5 During the writing of OET65B, the question was raised as to what constituted the power term in the FCC exemption formulae. The Committee discussed whether this should be based solely on the transmitter output power or also include averaging factors that reduce the power by a modulation factor and a transmit:receive duty cycle. In discussing this with our FCC liaisons we received the answer that anything controlled by the equipment, i.e., the modulation, should be included and anything controlled by the operator, i.e., the transmit:receive duty cycle, should not.

1.6 The Committee has discussed what constitutes a "normal" antenna, whose exposure can be assessed with an online calculator (i.e., far-field equation), and what types of antennas need more complicated analysis. In conjunction with our colleagues at RSGB, we have examined the exposures from very short dipoles and dipoles that are close to the ground. In both cases, there are instances when the far-field equation underestimates the exposure. We are continuing to study these special cases. We foresee a more complicated online calculator that selects its calculation method based on the antenna length and height.

1.7 The Committee has discussed some photos that have appeared in ARRL publications, such as QST and the ARRL Contest Update, as being potentially misleading about whether proper exposure practices are being followed. In particular, a photo of a portable contest operation may have shown an operator who is sitting too close to his VHF Yagi. Another photo on the cover of the February 2022 QST shows an operator standing at the back of several microwave dishes. It is likely that no overexposure existed in either of these photos, but the Committee felt that if there is any question, the editor should either not publish that particular photo or include a statement in the caption that RF exposure for that particular operating setup has been calculated and the exposure of the operator in the photo has been determined to be below FCC safety limits. In contrast, a photo in the March QST of a loop antenna mounted on the fence with the neighbor and with part of the antenna within touching distance clearly presents problems. Even if it could be proven that neighbors could not get close enough to the antenna to be overexposed, having an active antenna element within touching distance of an untrained person should always be avoided. The editors of QST have been alerted to look out for such photos and to contact Mr. Hare if there are any questions.

1.8 The Committee noticed an RF Safety-related question in the Technician question pool that is no longer valid following the FCC rule changes of May 2021. We alerted Maria Somma, AB1FM, the ARRL VEC Manager, that this question should not be selected for any Technician exams. Discovering this prompted the Committee to review other question pools and we learned that the Technician pool was due to be replaced in June 2022, so we suggested some replacement questions. We also discovered one question in the General Question Pool that has been obsoleted by the FCC rule change. The Committee has requested to be included in any future RF Safety-related question changes in the question pools.

1.9 The Committee discussed the current state of the FCC regulations regarding handheld radios. Our contacts at the FCC continue to be unclear about the way the exposure rules will be applied to amateur handheld radios. The FCC makes a distinction for any RF source that is within 20 cm of the body. Within that distance, an analysis is required, which is clearly beyond the means and abilities of almost all radio amateurs. In the commercial world, the manufacturers have been required to perform that type of testing, such as with cellular telephones and commercial handheld radios. They acknowledge that radio amateurs will not be expected to perform SAR testing on their handhelds. They also acknowledge that amateur radio equipment will not be subject to FCC certifications. Last year, Mr. Tell performed a survey of the SAR test results of handheld radios in the FCC database, concluding that in the 2m and 70cm bands many handheld radios with similar characteristics to amateur handheld radios are well within the SAR exposure limits. We hope that the FCC will allow us to adopt that form of comparison to avoid the need for testing of specific amateur handheld radios. It has been stated to us that the FCC is relying on their OET Laboratory Division to develop a testing document that includes amateur handhelds, though they did not have an answer for the question of how a handheld that has been modified by its amateur user should be tested. Amateurs continue to operate with handheld radios that have been grandfathered into the new regulations based on their designs that have not changed since the rules were modified last May. We believe that eventually the manufacturers will be required to perform SAR testing on their handheld radios, even without a requirement for obtaining FCC certification. For those radios used by the amateur radio service, the test results can be included with the packaging of the device and then the licensed amateur can use that to show compliance with the exposure regulations. There will be more to report on this subject in the future.

1.10 The Committee was contacted by a ham who uses a peripheral nerve stimulator for leg pain who would like to know if it safe to operate his station, or a multi-multi contest station that he occasionally helps to staff, while this device is in operation. Discussion from Dr. Small, Dr. Ross and Dr. Griffin ensued about how this device works and what danger might occur if there is interference from strong radio waves. Mr. Hare noted that immunity testing is only required down

to 80 MHz and many medical devices are not tested in the HF bands. Dr. Tribble obtained some testing data performed by the manufacturer that claimed that the device may be susceptible to RF interference but that there was no risk of injury to the patient. The Committee decided to collaborate with the ARRL EMC Committee in cases like this since this type of question combines the expertise of both committees.

2 Monitoring Current Events and Scientific Studies

2.1 A bill was introduced in the New Hampshire Legislature that was written in such a way as to supersede FCC exposure regulations, proposing exposure limits that are considerably lower than those in the federal regulations. The bill appears to have been written by anti-RF activists and is directed against the implementation of 5G cellular telephony. However, the exposure limits proposed could be applied to radio amateurs as well. Even though this bill did not move out of committee in the current legislative year, it still is being considered for next year. Dr. Lapin testified in Concord, New Hampshire to explain the long history of RF exposure regulation and the complete lack of scientific evidence that the current FCC limits have led to any increase in disease. Even if this bill was passed into law, it would likely be struck down by the federal preemption set forth in the Communications Act of 1934, as amended in 1996.

3 Participation in the Scientific RF Safety Community

3.1 Mr. Butcher continues to serve as the co-chair of IEEE ICES TC-95 Subcommittee SC-1: Techniques, Procedures, Instrumentation, and Computation.

3.2 Mr. Tell continues to serve as the chairman of the IEEE ICES TC-95 Subcommittee SC-2: Terminology, Units of Measurement, and Hazard Communication.

3.3 Mr. Hare continues to serve on the IEEE ICES TC-95 RF Safety Standards Committee.

3.4 Dr. Lapin continues to serve on the IEEE ICES TC-95 RF Safety Standards Committee.

3.5 Dr. Bushberg serves on the IEEE ICES TC-95 RF Safety Standards Committee.

3.6 Mr. Tell continues to serve as the chairman of the IEEE EMBS Committee on Man and Radiation, COMAR.

3.7 Mr. Butcher continues to serve as a member of the IEEE EMBS Committee on Man and Radiation, COMAR.

3.8 Dr. Lapin continues to serve as a member of the IEEE EMBS Committee on Man and Radiation, COMAR.

3.9 Dr. Bushberg serves as a member of the IEEE EMBS Committee on Man and Radiation, COMAR.

3.10 Dr. Lapin and Mr. Tell serve on the IEEE P.2725.1 Standard Committee, which sets the exposure limits for Microwave Medical Imaging Devices.

3.11 Mr. Butcher continues to serve as a member of the United States National Committee of the International Electrotechnical Commission (USNC/IEC) for TC106: Methods for the assessment of electric, magnetic and electromagnetic fields associated with human exposure.

4 Administrative Issues

4.1 Dr. Siwiak is a contributing editor for QST and Editor of QEX. He shares submitted RF Safety-related articles with the Committee.

4.2 Dr. Lapin has discussed collaboration between the Committee and the ARRL Electromagnetic Compatibility Committee with its chair, Carl Leutzelschwab, K9LA. When interference to a medical instrument occurs, it is generally reported to the RF Safety Committee, whose members examine the health implications of the interference. However, a core competency of the EMC Committee is electromagnetic interactions with all types of instrumentation. Thus, we feel that a combined effort between these two committees would provide the most value toward solving issues that occur when a piece of medical equipment is reported to be interfered with by amateur radio signals.

Respectfully submitted,

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Chair, ARRL RF Safety Committee

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