

An Amateur Radio Operator's Responsibility to Comply with FCC Guidelines on RF Human Exposure

Amateurs are required to evaluate their transmitting system to ensure that they are in compliance with established guidelines. The guidelines are based upon maximum permissible Human RF Exposure.

Background

The guidelines were first established when the FCC adopted ANSI RF Protection guidelines in 1985. The FCC's responsibility was mandated by the National Environmental Policy Act of 1969.

In 1997, the FCC issued OET Bulletin 65 and later Supplement B. Supplement B is information specific to Amateur Radio. These documents are freely available from several sources.

The Guidelines

The guidelines concern Exposure Limits, rather than Emission Limits. They categorize Exposure in Controlled Exposure and Uncontrolled Exposure.

The guidelines for Amateur stations were not arrived at capriciously, but rather as a result of much consultation with the Amateur community through the ARRL, and much data collection on actual Amateur stations. They recognized that Amateur radio station presented many challenges due to the diversity of their structures, transmitters and antenna systems.

While there will likely not be any enforcement activity, unless your station is causing a problem, the evaluation will easily justify the safety of your station to neighbors or others who might have concerns. Remember, there are legitimate reasons for you to protect yourself and others from RF overexposure.

How to Conduct a Station Evaluation

For many Amateur stations, the evaluation is short and simple. Consult the "Power Threshold Table", which can be found in FCC Supplement B and several ARRL publications. If your transmitted power falls below the levels of the table, you do not have to proceed further. It is my opinion that one should keep written records of all aspects of your evaluation in the event that the safety of your station is ever questioned.

Most HF stations using 100W or less are categorically exempted from having to conduct "routine evaluations". Routine Evaluations are periodic analyses conducted whenever there is a material change in the transmitting configuration.

[Show threshold table]

Handheld radios and Mobile radios, using a Push-to-Talk switch are also exempted. These exemptions do not mean that you never have to evaluate them, because you are still responsible to assure that persons near your station are not exposed to RF emissions above the guidelines.

Using the Supplement and Formulas

When the evaluation requirements were first made effective, the only available method of doing the evaluation was to convert a power and distance product, derived from processing such parameters as input power, feedline loss, duty factor, and distance, through complicated formulas, into power density levels. Then these results were compared to the tables of maximum allowable power densities. Later, antenna modeling programs shortened the process, by making some of the calculations. Eventually, easier methods were developed.

Using the FCC Worksheet

See Supplement B to OET Bulletin 65. Worksheets can also be obtained from ARRL website.

Using MPE Calculator Programs

You must know a few things to proceed. You must calculate the power delivered to the input of the antenna and the antenna gain. The antenna gain will either be in dBi or dBd. If the antenna gain figure you have is in dBd, you must add 2.2 dB to your figure to convert it to dBi. You should also know something about your feedline loss. It may be negligible, or it may be substantial. It has an effect upon the power reaching the antenna feedpoint. You must also know the nearest distance that a person might be to your antenna center point. Armed with this information and the frequency of interest, you can plug the figures into the calculator program and get a result.

Sources of More Information

FCC

<http://fcc.gov/oet>

ARRL

<http://www.arrl.org/rf-exposure>

ARRL Handbook for Radio Communications

RF Exposure and You

Numerous QST articles

Websites

On-Line Calculators

<http://hitlink.com/power>

<http://www.dxzone.com/cgi-bin/dir/jump2.cgi?ID=26301>

Downloadable Calculators

http://www.qsl.net/w0jec/index_files/W0JECProjects7.htm

<http://www.paulbunyan.net/users/crisman/index.html>

Any references found to the University of Texas Amateur Radio Club (N5XU) calculator is erroneous. It has not been available for several years.

Definitions

Controlled Exposure Limits – Limits of RF exposure within an area that access to can be limited.

Uncontrolled Exposure Limits – Limits of RF exposure within an area that access cannot to limited.

MPE – Maximum Permissible Exposure

MPE Limits - Measured in mw/cm^2

Code of Federal Regulations

Title 47 - Telecommunication

§ 1.1307 Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared.

(a)

(b) In addition to the actions listed in paragraph (a) of this section, Commission actions granting construction permits, licenses to transmit or renewals thereof, equipment authorizations or modifications in existing facilities, require the preparation of an Environmental Assessment (EA) if the particular facility, operation or transmitter would cause human exposure to levels of radiofrequency radiation in excess of the limits in §§ 1.1310 and 2.1093 of this chapter. Applications to the Commission for construction permits, licenses to transmit or renewals thereof, equipment authorizations or modifications in existing facilities must contain a statement confirming compliance with the limits unless the facility, operation, or transmitter is categorically excluded, as discussed below. Technical information showing the basis for this statement must be submitted to the Commission upon request. Such compliance statements may be omitted from license applications for transceivers subject to the certification requirement in § 25.129 of this chapter.

(1) The appropriate exposure limits in §§ 1.1310 and 2.1093 of this chapter are generally applicable to all facilities, operations and transmitters regulated by the Commission. However, a determination of compliance with the exposure limits in § 1.1310 or § 2.1093 of this chapter (routine environmental evaluation), and preparation of an EA if the limits are exceeded, is necessary only for facilities, operations and transmitters that fall into the categories listed in table 1, or those specified in paragraph (b)(2) of this section. All other facilities, operations and transmitters are categorically excluded from making such studies or preparing an EA, except as indicated in paragraphs (c) and (d) of this section. For purposes of table 1, building-mounted antennas means antennas mounted in or on a building structure that is occupied as a workplace or residence. The term power in column 2 of table 1 refers to total operating power of the transmitting operation in question in terms of effective radiated power (ERP), equivalent isotropically radiated power (EIRP), or peak envelope power (PEP), as defined in § 2.1 of this chapter.* For the case of the Cellular Radiotelephone Service, subpart H of part 22 of this chapter; the Personal Communications Service, part 24 of this chapter and the Specialized Mobile Radio Service, part 90 of this chapter, the phrase total power of all channels in column 2 of table 1 means the sum of the ERP or EIRP of all co-located simultaneously operating transmitters owned and operated by a single licensee. When applying the criteria of table 1, radiation in all directions should be considered. For the case of transmitting facilities using sectorized transmitting antennas, applicants and licensees should apply the criteria to all transmitting channels in a given sector, noting that for a highly directional antenna there is relatively little contribution to ERP or EIRP summation for other directions.

Table

Amateur Radio Service (part 97)

Transmitter output power > levels specified in § 97.13(c)(1) of this chapter.

§ 97.13 Restrictions on station location.

(a) Before placing an amateur station on land of environmental importance or that is significant in American history, architecture or culture, the licensee may be required to take certain actions prescribed by §§ 1.1305–1.1319 of this chapter.

(c) Before causing or allowing an amateur station to transmit from any place where the operation of the station could cause human exposure to RF electromagnetic field levels in excess of those allowed under § 1.1310 of this chapter, the licensee is required to take certain actions.

(1) The licensee must perform the routine RF environmental evaluation prescribed by § 1.1307(b) of this chapter, if the power of the licensee's station exceeds the limits given in the following table:

Table given