

## ADDITIONAL INFORMATION FOR AMATEUR RADIO OPERATORS

### ***FCC Requires Amateur Applicants to Read the RF Safety Certification***

The FCC requires all applicants to read the [RF Safety Certification](#). Unfortunately, FCC has not provided this additional information in any of their instructions. As a courtesy, the ARRL VEC has provided the information you will need to read and must comply with.

The certification statement is: "I have READ and WILL COMPLY with Section 97.13(c) of the Commission's Rules regarding RADIOFREQUENCY (RF) RADIATION SAFETY and the amateur service section of OST/OET Bulletin Number 65."

### ***FCC Rules and RF Safety Bulletin***

**FCC Section 97.13(c) reads:** *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 shall ensure compliance with the Commission's radio frequency exposure requirements in §§1.1307(b), 2.1091, and 2.1093 of this chapter, where applicable. In lieu of evaluation with the general population/uncontrolled exposure limits, amateur licensees may evaluate their operation with respect to members of his or her immediate household using the occupational/controlled exposure limits in §1.1310, provided appropriate training and information has been accessed by the amateur licensee and members of his/her household. RF exposure of other nearby persons who are not members of the amateur licensee's household must be evaluated with respect to the general population/uncontrolled exposure limits. Appropriate methodologies and guidance for evaluating amateur radio service operation is described in the Office of Engineering and Technology (OET) Bulletin 65, Supplement B.*
- 2. If the routine environmental evaluation indicates that the RF electromagnetic fields could exceed the limits contained in §1.1310 of this chapter in accessible areas, the licensee must take action to prevent human exposure to such RF electromagnetic fields. Further information on evaluating compliance with these limits can be found in the FCC's OET Bulletin 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields."*

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### ***Radio Frequency Exposure Rules - The Amateur Section of OET Bulletin Number 65:***

In a lengthy 2019 *Report and Order* (<https://docs.fcc.gov/public/attachments/FCC-19-126A1.pdf>) the FCC has announced that rule changes detailed governing RF exposure standards go into effect on May 3, 2021. The new rules do not change existing RF exposure (RFE) limits but do require that stations in all services, including amateur radio, be evaluated against existing limits, unless they are exempted. For stations already in place, that evaluation must be completed by May 3, 2023.

After May 3, 2021, any new station, or any existing station modified in a way that's likely to change its RFE profile — such as different antenna or placement or greater power — will need to conduct an evaluation by the date of activation or change.

Amateur Service licensees can no longer avoid performing an exposure assessment simply because they are transmitting below a given power level. For most amateurs, the major difference is the removal of the categorical exclusion for amateur radio, which means that ham station owners must determine if they either qualify for an exemption or must perform a routine environmental evaluation. A table of simply calculated exemptions is the first thing Radio Amateurs should use to see if they need to perform additional calculations.

The table of exemption formulae (Table 2), can be used for any distance, R, from a person to any part of the antenna, greater than 0.16 x wavelength or 20 cm, whichever is larger. When the exemptions do not apply, there are several online calculators that allow hams to determine the RF exposure around their stations quickly when conducting an evaluation. The ARRL website has a link to one of them, the Lake Washington Ham Club online calculator.

[www.lakewashingtonhamclub.org/resources/rf-exposure-calculator/](http://www.lakewashingtonhamclub.org/resources/rf-exposure-calculator/)

Although the FCC does not require hams to keep a copy of their RF safety evaluations, it's probably a good idea to have the evaluations on file.

**Table 2 – Single RF Sources Subject to Routine Environmental Evaluation Under MPE-Based Exemptions**

Transmitter frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R <sup>2</sup>
1.34-30	3,450 R <sup>2</sup> /f <sup>2</sup>
30-300	3.83 R <sup>2</sup>
300-1,500	0.0128 R <sup>2</sup> f
1,500-100,000	19.2 R <sup>2</sup>

*Note: R is in meters and f is in MHz.*

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**Bulletin 65, Appendix A, Table 1 -- LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)**

Limits for General Population/Uncontrolled Exposure				
Frequency	Electric Field	Magnetic Field	Power Density	Averaging Time
Range	Strength (E)	Strength (H)	(S)	$ E ^2,  H ^2$ or S
(MHz)	(V/m)	(A/m)	(mW/cm <sup>2</sup> )	(minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f <sup>2</sup> )*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1	30
f = frequency in MHz *Plane-wave equivalent power density				

Limits for Occupational/Controlled Exposure				
Frequency	Electric Field	Magnetic Field	Power Density	Averaging Time
Range	Strength (E)	Strength (H)	(S)	$ E ^2,  H ^2$ or S
(MHz)	(V/m)	(A/m)		(minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f <sup>2</sup> )*	6
30-300	61.4	0.163	1	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
f = frequency in MHz *Plane-wave equivalent power density				

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In complying with the Commission's Report and Order, amateur operators should follow a policy of systematic avoidance of excessive RF exposure. The Commission has said that it will continue to rely upon amateur operators, in constructing and operating their stations, to take steps to ensure that their stations comply with the MPE limits for both occupational/controlled and general public/uncontrolled situations, as appropriate. In that regard, amateur radio operators and members of their immediate household are considered to be in a "controlled environment" and are subject to the occupational/controlled MPE limits. Neighbors or others who are not members of an amateur operator's household are considered to be members of the general public, since they cannot reasonably be expected to exercise control over their exposure. In those cases general population/uncontrolled exposure MPE limits will apply.

In order to qualify for use of the occupational/controlled exposure criteria, appropriate restrictions on access to high RF field areas must be maintained and educational instruction in RF safety must be provided to individuals who are members of the amateur operator's household. Persons who are not members of the amateur operator's household but who are present temporarily on an amateur operator's property may also be considered to fall under the occupational/controlled designation provided that appropriate information is provided them about RF exposure potential if transmitters are in operation and such persons are exposed in excess of the general population/uncontrolled limits.

Amateur radio facilities represent a special case for determining exposure, since there are many possible antenna types that could be designed and used for amateur stations. However, several relevant points can be made with respect to analyzing amateur radio antennas for potential exposure that should be helpful to amateur operators in performing evaluations.

First of all, the generic equations described in FCC OET Bulletin 65 can be used for analyzing fields due to almost all antennas, although the resulting estimates for power density may be overly-conservative in some cases. Nonetheless, for general radiators and for aperture antennas, if the user is knowledgeable about antenna gain, frequency, power and other relevant factors, the equations in this document can be used to estimate field strength and power density. In addition, other resources are available to amateur radio operators for analyzing fields near their antennas. The ARRL Handbook for Radio Amateurs contains an excellent section on analyzing amateur radio facilities for compliance with RF guidelines. Also, the FCC and the EPA conducted a study of several amateur radio stations in 1996 that provides a great deal of measurement data for many types of antennas commonly used by amateur operators (see the FCC OET Web site at: <https://www.fcc.gov/general/oet-reports>

See also: Sections 1 and 2 of the FCC Regulations; FCC's "Amateur" Supplement B to OET Bulletin 65; the ARRL's publication entitled "RF Exposure and You"; the ARRL Web at: <http://www.arrl.org/rf-radiation-and-electromagnetic-field-safety>; and our RF Safety article in January 1998 QST (Pages 50-55) for more information.

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