

EVALUATING EXPOSURE

T0C04 — What factors affect the RF exposure of people near an amateur station antenna?

T0C06 — Which of the following is an acceptable method to determine whether your station complies with FCC RF exposure regulations?

T0C09 — How can you make sure your station stays in compliance with RF safety regulations?

Table 9.4

Single RF Sources Subject to Routine Environmental Evaluation Under MPE-Based Exemptions, $R \geq \lambda/2\pi$

<i>Transmitter Frequency</i>	<i>Threshold Effective Radiated Power (ERP)</i>
0.3 – 1.34	1,920 R ²
1.34 – 30	3,450 R ² /f ²
30 – 300	3.83 R ²
300 – 1500	0.0128 R ² f
1500 – 100000	19.2 R ²

Note: Transmitter frequency is in MHz, threshold ERP is in watts, R is in meters, and frequency (f) is in MHz. Using Table 9.4 for the frequency (f in MHz) and separation distance (R in meters) at which the RF source operates, single RF sources are exempt if the ERP (in watts) is no more than the calculated value prescribed for that frequency. For the exemption in table 9.4 to apply, the separation distance in meters (R) must be at least $\lambda/2\pi$ where λ is the free-space operating wavelength. If the ERP of a single RF source is not easily obtained, then the available maximum (source-based) time-averaged power may be used in lieu of ERP if the device antenna(s) or radiating structure(s) do not exceed the electrical length of $\lambda/4$. If the ERP of the single RF source and transmitting antenna(s), including coherent array, exceeds the ERP threshold, the RF source is not exempt, and the applicant must prepare an evaluation.

On May 3, 2021, the FCC adopted new rules about which stations need to conduct an RF Exposure evaluation before they start operating. **Table 9.4** lists effective radiated power (ERP) threshold formulas based on frequency and the separation distance between any person and any part of the antenna. If your station doesn't exceed the ERP threshold, then you qualify for an evaluation exemption.

If you do need to do an evaluation, ARRL has an easy-to-use calculator based on one originally provided by the Lake Washington Ham club of Kirkland, WA, which you can find at arrrl.org/rf-exposure-calculator. To use the calculator, you will need to know the power at your antenna, your operating mode(s), the amount of time you are transmitting vs. receiving, your antenna gain and your operating frequency (or frequencies) in MHz. These factors, as well as the distance of any person from the antenna and its radiation pattern, determine the RF fields that can potentially expose people. **[T0C04]** You can find the necessary tables of FCC exposure limits and criteria on the ARRL VEC website at arrrl.org/files/file/VEs/RF%20safety%20Info%20June%202021.pdf.

The ARRL calculator uses criteria set by the FCC's OET Bulletin 65 (OET stands for Office of Engineering and Technology) and provides a simple method for determining compliance with exposure regulations. However, more complex computer modeling of RF fields or measurements of field strength with calibrated equipment can also be used for assessing compliance, though they're often more complicated and expensive. **[T0C06]**

Once you've done an evaluation, or if you already did one under the old rules, you don't need to re-evaluate unless you change equipment or operating mode at your station that affects average ERP, such as increasing transmitter power or antenna gain, adding new antennas, moving your existing antennas, or adding a new frequency band. **[T0C09]**

EXPOSURE SAFETY MEASURES

T0C08 — Which of the following actions can reduce exposure to RF radiation?

What if you do find a potential hazard? What if you are just beginning to build a station and want to avoid creating a hazard? You have plenty of options as shown in **Figure 9.6**:

- Locate antennas away from where people can get close to them and away from property lines. This is always a good idea since touching an antenna energized with even low-power signals can result in an RF burn. **[T0C08]**
- Raise the antenna. This is another good idea because it usually improves your signal in