RF EXPOSURE UPDATE

- FCC RULING TAKES EFFECT MAY 3, 2021 TO REMOVE RADIO EXEMPTIONS
- STUDY HAS BEEN UNDERWAY FOR NEARLY 10 YEARS
- FCC REPORT AND ORDER 19-126
  - > HARMONIZES EXPOSURE RULES ACROSS ALL SERVICES
  - > MAXIMUM PERMISSIBLE EXPOSURE (MPE) – NO CHANGE

SO, WHAT IS THE BIG ISSUE?

- The Specific Absorption Rate (SAR) is a critical number
  - The rate at which energy is absorbed by tissue, measured in W/Kg
  - Very expensive and difficult to model or measure
- Maximum Permissible Exposure (MPE)
  - Assume plain wave exposure
  - E-field and H-field measurements
  - EM power density typically measured in nW/cm^2
- Why do amateur operators need to do this?
  - We are the only group licensed to experiment with RF
  - We can place antennas wherever and however we wish

Controlled Exposure
- Occupational
- Home/residence
- Families included

Uncontrolled Exposure
- General population
- Not fully aware of dangers

HIGHLIGHTS

- RF Exposure limits have not changed – overexposure to RF is to be avoided
- ***No RF station is exempt from compliance with the FCC's rules and the MPE limits.***
- Amateur radio operators have until May 3rd, 2023, to meet the changed requirements, that is complete an environmental assessment of your station.
- Portable radios manufactured before May 3rd, 2021, are grandfathered
- All new portable radios manufactured after May 3rd, 2021, will have to meet exposure requirements by the manufacturers (will likely add cost)
- ARRL RF Safety Committee is helping FCC to develop methodology to make these rules easier for hams to follow.

CHANGES

- Amateur radio licensees are expected to validate they are in compliance with RF exposure limits per OET Bulletin 65, same as all FCC licenses
- All FCC licensed services and operators are expected to have on file and able to produce calculations related to RF exposure
- Mostly effects fixed and mobile installations where transmissions occur between 1.3 MHz to 300 MHz

NO MORE EXCLUSIONS, ONLY EXEMPTIONS

- New descriptions:
  - Antenna less than 20 cm (8”) from a body must be measured or modeled with SAR.
  - Total SAR Exemptions are only valid for frequencies above 300 MHz
  - Take into account frequency, maximum ERP and T/R duty cycle
  - Exemption not acceptable in reactive near-field ($\lambda/2\pi$) {Note: Frequency is formula.}

Frequency (MHz)	Maximum ERP (watts) Note: R=meters
VLF 0.3 – 1.34	$1920 * R^2$
HF 1.34 – 30	$3450 * R^2/f^2$
VHF 30 – 300	$3.83 * R^2$
UHF 300 – 1500	$0.0128 * R^2 f$
MW 1500 – 100,000	$19.2 * R^2$

Example Calculation:

- Multiband Vertical, 15’ from sidewalk
- 100 Watt Transmitter, 20, 17, 15, 12 & 10 meters
- Using HF exemption, only need to calculate for 10M
- Calculate losses and antenna gain to find ERP
- Calculated ERP: 78W {with losses and gain}
- Maximum ERP: 97.8 W
- All is good, EXCEPTION is ALLOWED

EXEMPTION MINIMUM DISTANCES ($\lambda/2\pi$) (CLOSER THAN THESE DISTANCES – NO EXEMPTIONS)

- 160 meters 82.8 ft
- 80 meters 41.3 ft
- 75 meters 38.8 ft
- 40 meters 20.7 ft
- 30 meters 15.5 ft
- 20 meters 10.3 ft
- 17 meters 8.8 ft
- 15 meters 7.8 ft
- 12 meters 6.2 ft
- 10 meters 5.2 ft
- 6 meters 3.1 ft
- 2 meters 1 ft
- 1.25 meters 7.8 in
- 70 cm 4.3 in
- 33 cm 2.0 in

SUMMARY

- General awareness of RF exposure issues
- Mobiles operating HF (Too close to antenna for extended time periods)
- Stations using end fed, verticals and NVIS antennas of highest concern
- HF Stations running power >100 watts and VHF >50W
- Any time a change is made to a ham's station, relative to RF, a new study or updated study is required
- Completed study and ready to produce to the FCC will make life easier in the event they come calling due to a complaint

SO, WHAT SHOULD A HAM DO?

- If you have completed a RF exposure study and it is up to date, all is well.
- If you have not completed a RF exposure study, you have until May 3, 2023 to complete a study.
  - Use EZNEC (https://www.eznec.com), a free software.
  - Use an on-line calculator, loading TX duty cycle and mode of operation (three possible)
    - http://hintlink.com/power_density.htm
    - http://www.lakewashingtonhamclub.org/resources/rf-exposure-calculator/
    - http://hamradioschool.com/rf-exposure-calculator/
- ARRL: http://www/arrl.org/rf-exposure
- FCC: https://docs.fcc.gov/public/attachments/FCC-19126A1.pdf