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Calculated Radio Frequency Emissions Report

EVERSOURCE ENERGY

East Hampton

22 East High Street, East Hampton, Connecticut

March 11, 2016

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1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for Eversource Energy's (formerly Northeast Utilities) proposed new lattice tower to be located at 22 East High Street in East Hampton, Connecticut. The proposed 120' self-support will be replacing an existing 75-foot wood pole and associated antennas. The coordinates of the tower are: 41° 34' 54.3" N, 72° 30' 10.3" W.

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by OET Bulletin 65 Edition 97-01. These new rules include Maximum Permissible Exposure (MPE) limits for transmitters operating between 300 kHz and 100 GHz. The FCC MPE limits are based upon those recommended by the National Council on Radiation Protection and Measurements (NCRP), developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI).

The FCC general population/uncontrolled limits set the maximum exposure to which most people may be subjected. General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Public exposure to radio frequencies is regulated and enforced in units of milliwatts per square centimeter (mW/cm^2). The general population exposure limits for the various frequency ranges are defined in the attached "FCC Limits for Maximum Permissible Exposure (MPE)" in Attachment B of this report.

Higher exposure limits are permitted under the occupational/controlled exposure category, but only for persons who are exposed as a consequence of their employment and who have been made fully aware of the potential for exposure, and they must be able to exercise control over their exposure. General population/uncontrolled limits are five times more stringent than the levels that are acceptable for occupational, or radio frequency trained individuals. Attachment B contains excerpts from OET Bulletin 65 and defines the Maximum Exposure Limit.

Finally, it should be noted that the MPE limits adopted by the FCC for both general population/uncontrolled exposure and for occupational/controlled exposure incorporate a substantial margin of safety and have been established to be well below levels generally accepted as having the potential to cause adverse health effects.

3. RF Exposure Prediction Methods

The emission field calculation results displayed in the following figures were generated using the following formula as outlined in FCC bulletin OET 65:

$$\text{Power Density} = \left(\frac{1.6^2 \times EIRP}{4\pi \times R^2} \right) \text{x Off Beam Loss}$$

Where:

EIRP = Effective Isotropic Radiated Power

R = Radial Distance = $\sqrt{(H^2 + V^2)}$

H = Horizontal Distance from antenna in meters

V = Vertical Distance from radiation center of antenna in meters

Ground reflection factor of 1.6

Off Beam Loss is determined by the selected antenna pattern

These calculations assume that the antennas are operating at 100 percent capacity and power, and that all channels are transmitting simultaneously. Obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. The calculations assume even terrain in the area of study and do not take into account actual terrain elevations which could attenuate the signal. As a result, the predicted signal levels reported below are much higher than the actual signal levels will be from the final site configuration.

4. Calculation Results

Table 1 below outlines the power density information for the site. The radiation patterns of the proposed Eversource Energy's antennas cause the majority of the RF power to be focused out towards the horizon, with respect to the vertical plane. As a result, there will be less RF power directed below the antenna relative to the horizon, and consequently lower power density levels around the base of the tower. Please refer to Attachment C for the vertical patterns of the proposed Eversource Energy antennas. The calculated results for Eversource Energy in Table 1 include a nominal 10 dB off-beam pattern loss for the 450 MHz, 900 MHz and 6000 MHz antennas to account for the lower relative gain below the antennas.

Carrier	Antenna Height (Feet)	Operating Frequency (MHz)	Number of Trans.	ERP Per Transmitter (Watts)	Power Density (mw/cm^2)	Limit	%MPE
Eversource	130	900	1	240	0.0005	0.6000	0.09%
Eversource	130	450	1	1,000	0.0021	0.3000	0.71%
Eversource	127	48.38	1	100	0.0022	0.2000	1.11%
Eversource	117	6004.5	1	14,125	0.0371	1.0000	3.71%
Eversource	117	6256.54	1	14,125	0.0371	1.0000	3.71%
Eversource	105	154	1	180	0.0059	0.2000	2.94%
Eversource	103.5	49.1	1	100	0.0034	0.2000	1.68%
Eversource	87.5	49.28	1	100	0.0047	0.2000	2.35%
						Total	16.29%

Table 1: Carrier Information

5. Conclusion

The above analysis verifies that RF emissions from the site will be below the maximum power density levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Even when using conservative methods, the cumulative power density from the proposed and existing transmit antennas is below the limits for the general public. The highest expected percent of Maximum Permissible Exposure at ground level is **16.29% of the FCC General Population/Uncontrolled limit**.

As noted previously, obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. As a result, the predicted signal levels are more conservative (higher) than the actual signal levels will be from the final site configuration.

6. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The calculations follow guidelines set forth in ANSI/IEEE Std. C95.3, ANSI/IEEE Std. C95.1 and FCC OET Bulletin 65 Edition 97-01.

March 11, 2016
Date

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C Squared Systems, LLC

Attachment A: References

OET Bulletin 65 - Edition 97-01 - August 1997 Federal Communications Commission Office of Engineering & Technology

ANSI C95.1-1982, American National Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300 kHz to 100 GHz. IEEE-SA Standards Board

IEEE Std C95.3-1991 (Reaff 1997), IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave. IEEE-SA Standards Board

Attachment B: FCC Limits for Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/Controlled Exposure[1]

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $|E|^2$, $|H|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	($900/f^2$)*	6
30-300	61.4	0.163	1.0	6
300-1500	-	-	f/300	6
1500-100,000	-	-	5	6

(B) Limits for General Population/Uncontrolled Exposure[2]

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $|E|^2$, $|H|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	($180/f^2$)*	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

f = frequency in MHz * Plane-wave equivalent power density

Table 2: FCC Limits for Maximum Permissible Exposure (MPE)

[1] Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

[2] General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

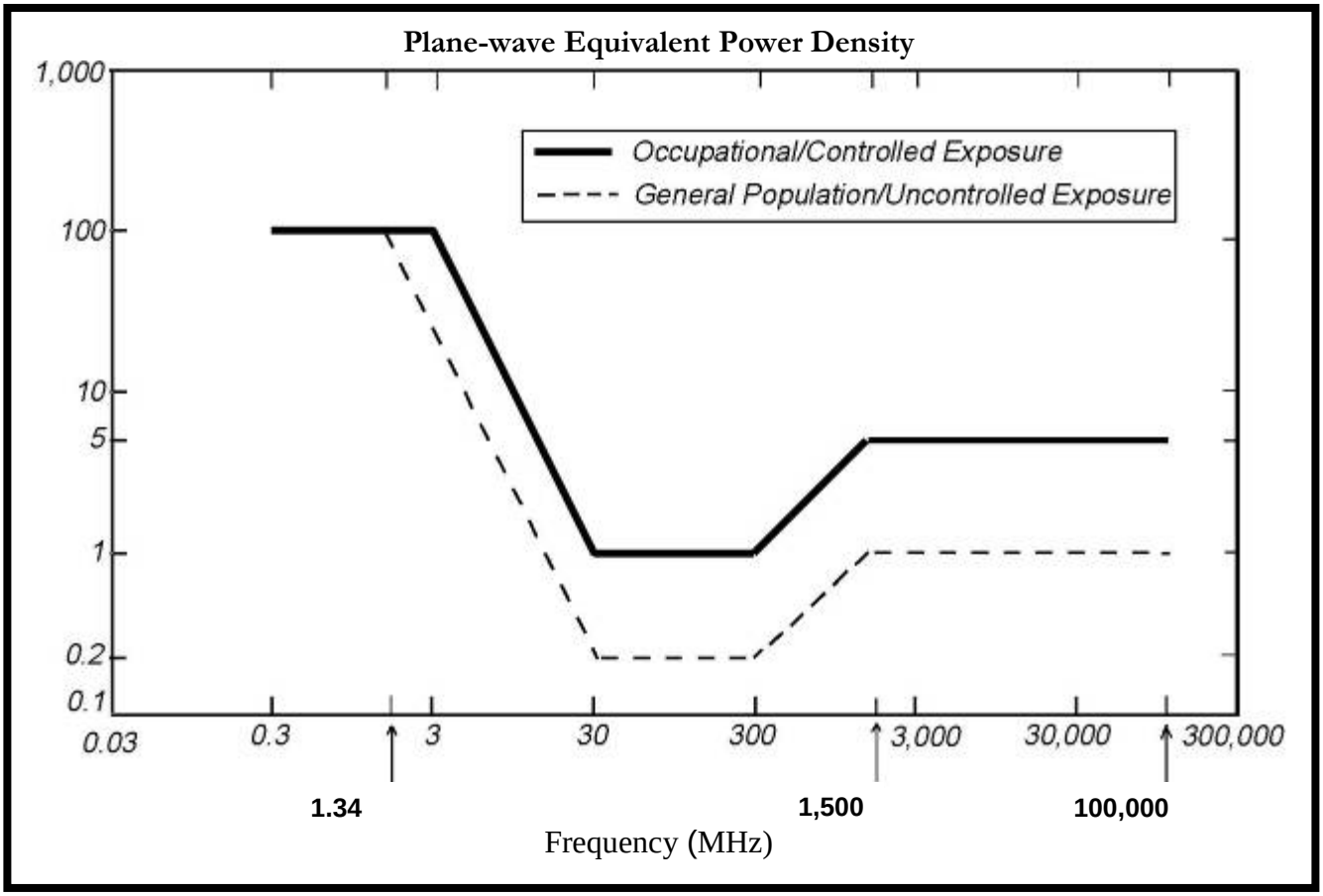
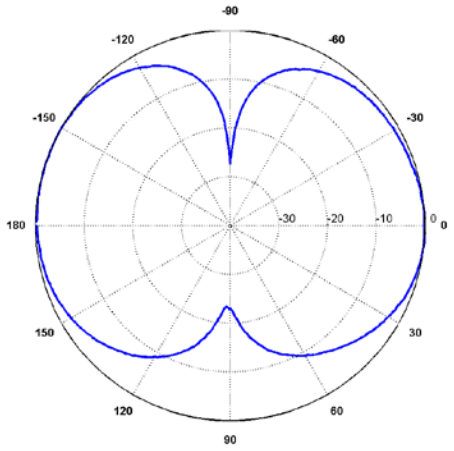


Figure 1: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: Antenna Data Sheets and Electrical Patterns[3]

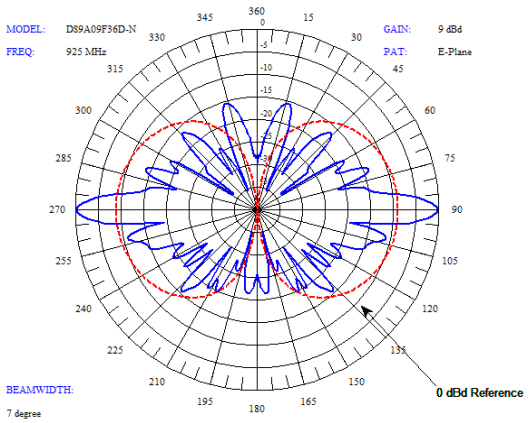
48-49 MHz

Manufacturer:	Kreco
Model #:	CO-41-AN
Frequency Band:	30-50 MHz
Gain:	0 dBd
Vertical Beamwidth:	N/A
Horizontal Beamwidth:	360°
Polarization:	Vertical
Length:	15’



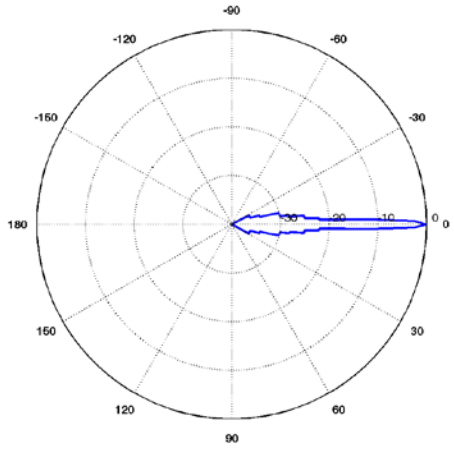
900 MHz

Manufacturer:	DBSpectra
Model #:	DS9A09F36D-N
Frequency Band:	896-960 MHz
Gain:	9.0 dBd
Vertical Beamwidth:	8°
Horizontal Beamwidth:	360°
Polarization:	Vertical
Length:	21’

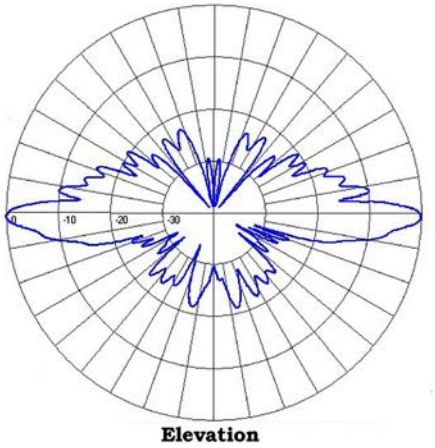


6000 MHz

Manufacturer:	RFS
Model #:	PADX6-59A
Frequency Band:	5925 - 6425 MHz
Gain:	38.5 dBd
Vertical Beamwidth:	1.8°
Horizontal Beamwidth:	1.8°
Polarization:	Dual
Diameter:	6’



[3] In the case where pattern data was unavailable from the manufacturer, vertical patterns shown are for antennas with similar specifications.

450 MHz Manufacturer: Sinclair Model #: SC331-SF2LDF Frequency Band: 450-463 MHz Gain: 10 dBd Vertical Beamwidth: 6° Horizontal Beamwidth: 360° Polarization: Vertical Length: 20’	
150 MHz Manufacturer: Telewave Model #: ANT150F2 Frequency Band: 148-174 MHz Gain: 2.5 dBd Vertical Beamwidth: 38° Horizontal Beamwidth: 360° Polarization: Vertical Length: 5’