



WATERFORD

Radio Frequency Emissions Compliance Report For Verizon Wireless

Site Name:	East Quincy	Site Structure Type:	Monopine
Address:	1538 Lee Road	Latitude:	39.93861667
	Quincy, CA 95971	Longitude:	-120.91143056
Report Date:	July 13, 2021	Project:	Modification

Compliance Statement

Based on information provided by Verizon Wireless and predictive modeling, the East Quincy installation proposed by Verizon Wireless will be compliant with Radiofrequency Radiation Exposure Limits of 47 C.F.R. §§ 1.1307(b)(3) and 1.1310. The proposed operation will not expose members of the General Public to hazardous levels of RF energy at ground level or in adjacent buildings. As predicted RF power densities will not exceed the FCC General Population limits, no mitigation action other than restricting access to the tower is required to achieve or maintain compliance.

Certification

I, David H. Kiser, am the reviewer and approver of this report and am fully aware of and familiar with the Rules and Regulations of both the Federal Communications Commissions (FCC) and the Occupational Safety and Health Administration (OSHA) with regard to Human Exposure to Radio Frequency Radiation, specifically in accordance with FCC's OET Bulletin 65. I have reviewed this Radio Frequency Exposure Assessment report and believe it to be both true and accurate to the best of my knowledge.

General Summary

The compliance framework is derived from the Federal Communications Commission (FCC) Rules and Regulations for preventing human exposure in excess of the applicable Maximum Permissible Exposure ("MPE") limits. At any location at this site, the power density resulting from each transmitter may be expressed as a percentage of the frequency-specific limits and added to determine if 100% of the exposure limit has been exceeded. The FCC Rules define two tiers of permissible exposure differentiated by the situation in which the exposure takes place and/or the status of the individuals who are subject to exposure. General Population / Uncontrolled exposure limits apply to those situations in which persons may not be aware of the presence of electromagnetic energy, where exposure is not employment-related, or where persons cannot exercise control over their exposure. Occupational / Controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment, have been made fully aware of the potential for exposure, and can exercise control over their exposure. Based on the criteria for these classifications, the FCC General Population limit is considered to be a level that is safe for continuous exposure time. The FCC General Population limit is 5 times more restrictive than the Occupational limits.

In situations where the predicted MPE exceeds the General Population threshold in an accessible area as a result of emissions from multiple transmitters, FCC licensees that contribute greater than 5% of the aggregate MPE share responsibility for mitigation.

Table 1: FCC Limits

Frequency (MHz)	Limits for General Population/ Uncontrolled Exposure		Limits for Occupational/ Controlled Exposure	
	Power Density (mW/cm ²)	Averaging Time (minutes)	Power Density (mW/cm ²)	Averaging Time (minutes)
30-300	0.2	30	1	6
300-1500	f/1500	30	f/300	6
1500-100,000	1.0	30	5.0	6

f=Frequency (MHz)

Based on the computational guidelines set forth in FCC OET Bulletin 65, Waterford Consultants, LLC has developed software to predict the overall Maximum Permissible Exposure possible at any location given the spatial orientation and operating parameters of multiple RF sources. The power density in the Far Field of an RF source is specified by OET-65 Equation 5 as follows:

$$S = \frac{EIRP}{4 \cdot \pi \cdot R^2} \text{ (mW/cm}^2\text{)}$$

where EIRP is the Effective Radiated Power relative to an isotropic antenna and R is the distance between the antenna and point of study. Additionally, consideration is given to the manufacturers' horizontal and vertical antenna patterns as well as radiation reflection. At any location, the predicted power density in the Far Field is the spatial average of points within a 0 to 6-foot vertical profile that a person would occupy. Near field power density is based on OET-65 Equation 20 stated as

$$S = \left(\frac{180}{\theta_{BW}} \right) \cdot \frac{100 \cdot P_{in}}{\pi \cdot R \cdot h} \text{ (mW/cm}^2\text{)}$$

where P_{in} is the power input to the antenna, θ_{BW} is the horizontal pattern beamwidth and h is the aperture length.

Some antennas employ beamforming technology where RF energy allocated to each customer device is dynamically directed toward their location. In the analysis presented herein, predicted exposure levels are based on all beams at full utilization (i.e. full power) simultaneously focused in any direction. As this condition is unlikely to occur, the actual power density levels at ground and at adjacent structures are expected to be less than the levels reported below. These theoretical results represent maximum-case predictions as all RF emitters are assumed to be operating at 100% duty cycle.

Analysis

Verizon Wireless proposes the following installation at this location:

- (9) NEW VERIZON WIRELESS ANTENNAS
- (11) NEW VERIZON WIRELESS RADIOS, (3) @ ALPHA, (3) @ BETA S & (5) @ GAMMA SECTOR

The antennas will be mounted on a 75-foot Monopine with centerlines 66 feet above ground level. Proposed antenna operating parameters are listed in Appendix A. Other appurtenances such as GPS antennas, RRUs and hybrid cable below the antennas are not sources of RF emissions. No other antennas are known to be operating in the vicinity of this site.

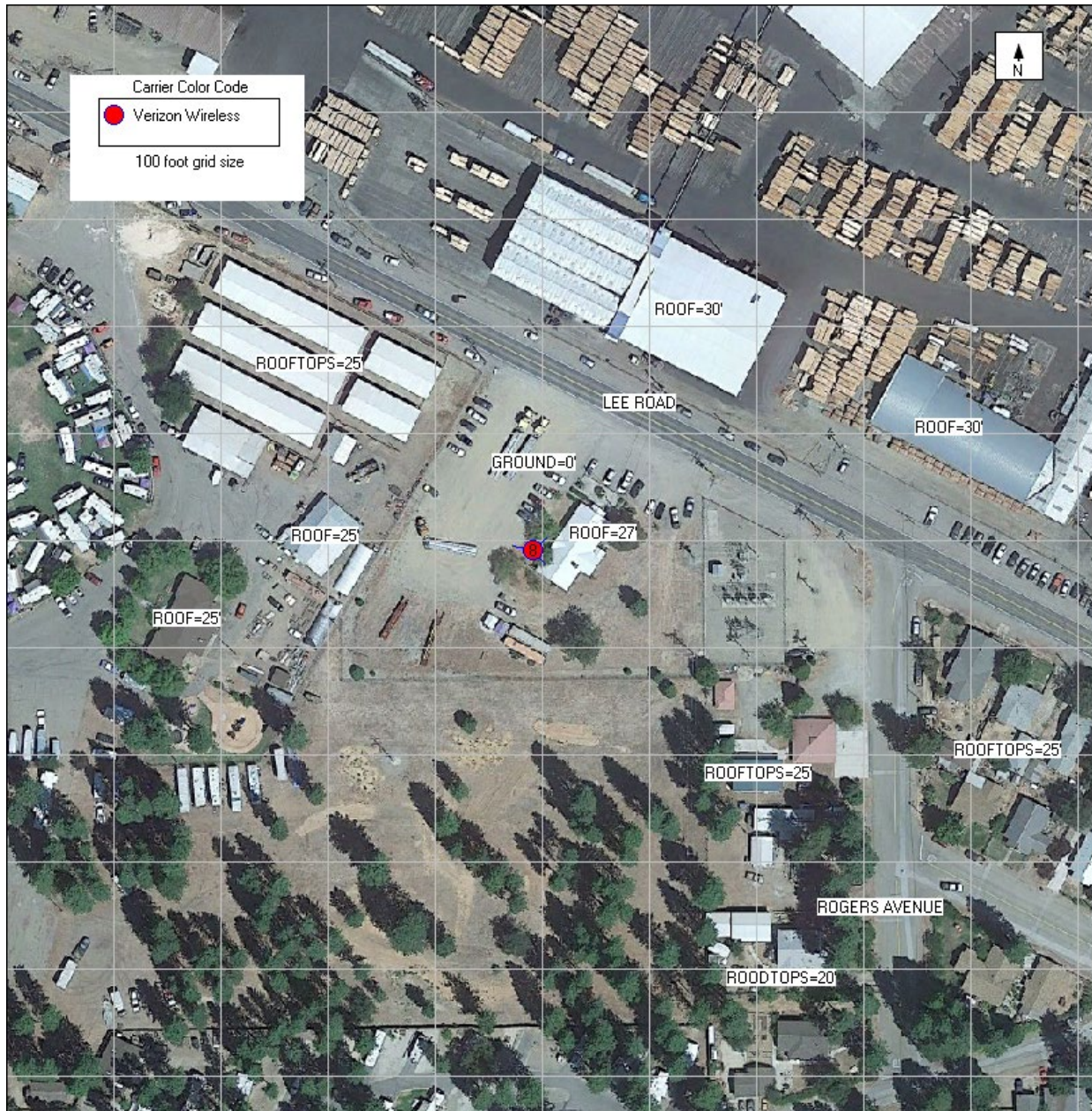


Figure 1: Antenna Locations

Power density decreases significantly with distance from any antenna. The panel-type antennas to be employed at this site are highly directional by design and the orientation in azimuth and mounting elevation, as documented, serves to reduce the potential to exceed MPE limits at any location other than directly in front of the antennas. For accessible areas at ground level, the maximum predicted power density level resulting from all Verizon Wireless operations is 20.96% of the FCC General Population limits. Incident at adjacent buildings depicted in Figure 1, the maximum predicted power density level resulting from all Verizon Wireless operations is 24.8231% of the FCC General Population limits. The proposed operation will not expose members of the General Public to hazardous levels of RF energy at ground level or in adjacent buildings. As predicted RF power densities will not exceed the FCC General Population limits, no mitigation action other than restricting access to the tower is required to achieve or maintain compliance.

Appendix A: Operating Parameters Considered in this Analysis

Antenna #:	Carrier:	Manufacturer	Pattern:	Band (MHz):	Mech Az (deg):	Mech DT (deg):	H BW (deg):	Length (ft):	TPO (W):	Channels:	Loss (dB):	Gain (dBd):	ERP (W):	EIRP (W):	Rad Center (ft):
1	Verizon	COMMSCOPE	NHH-65C-R2B 02DT	2100	50	0	62	8	20	4	0	16.29	3405	5586	66
1	Verizon	COMMSCOPE	NHH-65C-R2B 02DT	2100	50	0	62	8	40	4	0	16.29	6810	11172	66
2	Verizon	COMMSCOPE	NHH-65C-R2B 02DT	700	50	0	65	8	40	2	0	13.4	1750	2871	66
2	Verizon	COMMSCOPE	NHH-65C-R2B 02DT	850	50	0	62	8	40	2	0	13.65	1854	3042	66
3	Verizon	COMMSCOPE	NHH-65C-R2B 02DT	700	50	0	65	8	40	2	0	13.4	1750	2871	66
3	Verizon	COMMSCOPE	NHH-65C-R2B 02DT	850	50	0	62	8	40	2	0	13.65	1854	3042	66
3	Verizon	COMMSCOPE	NHH-65C-R2B 02DT	1900	50	0	66	8	60	4	0	15.72	8958	14696	66
4	Verizon	COMMSCOPE	NHH-65C-R2B 02DT	2100	140	0	62	8	20	4	0	16.29	3405	5586	66
4	Verizon	COMMSCOPE	NHH-65C-R2B 02DT	2100	140	0	62	8	40	4	0	16.29	6810	11172	66
5	Verizon	COMMSCOPE	NHH-65C-R2B 02DT	700	140	0	65	8	40	2	0	13.4	1750	2871	66
5	Verizon	COMMSCOPE	NHH-65C-R2B 02DT	850	140	0	62	8	40	2	0	13.65	1854	3042	66
6	Verizon	COMMSCOPE	NHH-65C-R2B 02DT	700	140	0	65	8	40	2	0	13.4	1750	2871	66
6	Verizon	COMMSCOPE	NHH-65C-R2B 02DT	850	140	0	62	8	40	2	0	13.65	1854	3042	66
6	Verizon	COMMSCOPE	NHH-65C-R2B 02DT	1900	140	0	66	8	60	4	0	15.72	8958	14696	66
7	Verizon	MATSING	MS-MBA-3.2-H4-L4 AZ -30 15DT	700	280	0	40	6	40	4	0	10.02	1607	2637	66
7	Verizon	MATSING	MS-MBA-3.2-H4-L4 AZ +30 15DT	700	280	0	40	6	40	4	0	10.07	1626	2668	66
7	Verizon	MATSING	MS-MBA-3.2-H4-L4 AZ -30 15DT	850	280	0	33	6	40	4	0	12.88	3105	5095	66
7	Verizon	MATSING	MS-MBA-3.2-H4-L4 AZ +30 15DT	850	280	0	36	6	40	4	0	12.54	2872	4711	66
8	Verizon	MATSING	MS-MBA-3.2-H4-L4 AZ -40 15DT	1900	280	0	25	6	40	4	0	15.68	5917	9708	66
8	Verizon	MATSING	MS-MBA-3.2-H4-L4 AZ 0 15DT	1900	280	0	24	6	40	4	0	15.16	5250	8612	66
8	Verizon	MATSING	MS-MBA-3.2-H4-L4 AZ +40 15DT	1900	280	0	23	6	40	4	0	15.2	5298	8692	66
9	Verizon	MATSING	MS-MBA-3.2-H4-L4 AZ -40 15DT	2100	280	0	22	6	40	4	0	16.22	6701	10993	66
9	Verizon	MATSING	MS-MBA-3.2-H4-L4 AZ 0 15DT	2100	280	0	21	6	40	4	0	15.7	5945	9753	66
9	Verizon	MATSING	MS-MBA-3.2-H4-L4 AZ +40 15DT	2100	280	0	22	6	40	4	0	15.67	5904	9685	66

Notes: Table depicts recommended operating parameters for Verizon Wireless proposed operations.