NEW YORK SMSA LIMITED PARTNERSHIP d/b/a VERIZON

BELLE MEAD 3 SITE

26 DEAD TREE RUN ROAD
SKILLMAN, NEW JERSEY

RF EMISSION STUDY

AUGUST 12, 2022

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NJ Board of Professional Engineers
Certificate of Authorization No. 24GA28156300

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Introduction

V-COMM, L.L.C. has been commissioned by New York SMSA Limited Partnership d/b/a Verizon Wireless, to ensure that the proposed radio facility complies with Federal Communications Commission (FCC) regulations as required by the Telecommunications Act of 1996. This report will show, through the use of FCC suggested prediction methods, that the radio facility in question will be in compliance with all appropriate Federal regulations in regards to Radio Frequency (RF) Emissions. The final results of the analysis are summarized below:

OET-65 STANDARD	Controlled Environment	Uncontrolled Environment
Calculated Percentage of Maximum Emissions	1.5222 %	7.6111 %

Case Summary

The proposed "BELLE MEAD 3" radio facility site will be a proposed 135 foot monopole located at 26 Dead Tree Run Road in the Town of Skillman in Somerset County, New Jersey. Verizon will operate nine (9) panel antennas from the monopole utilizing LTE and NR technologies. The Verizon antennas will be mounted at a centerline of 132 feet Above Ground Level (AGL) on the monopole. Technical data considered for Verizon is listed in tables 1a through 1e below.

Table 1a – Technical Data for Verizon 750 MHz LTE

VERIZON	Sector 1	Sector 2	Sector 3
Antenna	CommScope NHH-65B-R2B	CommScope NHH-65B-R2B	CommScope NHH-65B-R2B
Antenna Centerline (feet)	132	132	132
Orientation (deg. TN)	0	130	220
Electrical Downtilt (deg.)	5	5	5
ERP (Watts)	695	695	695
Frequency (MHz)	750	750	750
# Carriers	4	4	4
R/C Height Above Measurement Point (feet)	106	106	106

Table 1b – Technical Data for Verizon 850 MHz LTE/NR

VERIZON	Sector 1	Sector 2	Sector 3
Antenna	CommScope NHH-65B-R2B	CommScope NHH-65B-R2B	CommScope NHH-65B-R2B
Antenna Centerline (feet)	132	132	132
Orientation (deg. TN)	0	130	220
Electrical Downtilt (deg.)	5	5	5
ERP (Watts)	762	762	762
Frequency (MHz)	850	850	850
# Carriers	4	4	4
R/C Height Above Measurement Point (feet)	106	106	106

Table 1c – Technical Data for Verizon 1950 MHz LTE

VERIZON	Sector 1	Sector 2	Sector 3
Antenna	CommScope NHH-65B-R2B	CommScope NHH-65B-R2B	CommScope NHH-65B-R2B
Antenna Centerline (feet)	132	132	132
Orientation (deg. TN)	0	130	220
Electrical Downtilt (deg.)	3	3	3
ERP (Watts)	1419	1419	1419
Frequency (MHz)	1950	1950	1950
# Carriers	4	4	4
R/C Height Above Measurement Point (feet)	106	106	106

Table 1d – Technical Data for Verizon 2100 MHz LTE

VERIZON	Sector 1	Sector 2	Sector 3
Antenna	CommScope NHH-65B-R2B	CommScope NHH-65B-R2B	CommScope NHH-65B-R2B
Antenna Centerline (feet)	132	132	132
Orientation (deg. TN)	0	130	220
Electrical Downtilt (deg.)	3	3	3
ERP (Watts)	1596	1596	1596
Frequency (MHz)	2100	2100	2100
# Carriers	4	4	4
R/C Height Above Measurement Point (feet)	106	106	106

Table 1e – Technical Data for Verizon 3800 MHz NR

VERIZON	Sector 1	Sector 2	Sector 3
Antenna	Samsung MT6407-77A	Samsung MT6407-77A	Samsung MT6407-77A
Antenna Centerline (feet)	132	132	132
Orientation (deg. TN)	0	130	220
Electrical Downtilt (deg.)	3	3	3
ERP (Watts)	675	675	675
Frequency (MHz)	3800	3800	3800
# Carriers	64	64	64
R/C Height Above Measurement Point (feet)	106	106	106

RF Exposure Prediction Methods

The FCC has established the following equation to calculate the cumulative power density in the far-field region.

$$S = \frac{(1.64)\times(0.64)\times NC \times ERP_{relative}}{\pi \times R^2}$$

$$R = \sqrt{V^2 + \Delta h^2}$$

$$\boldsymbol{ERP_{relative} = 10^{\left[\frac{10\times log(P)+MaxAntennaGain-Pattern(\alpha)}{10}\right]}}$$

Where:

S = *Power Density (milliwatts/cm^2)*

NC = *The number of channel/carriers assigned to the antenna/site*

ERP = *The maximum Effective Radiated Power of the site (milliwatts)*

ERP$_{relative}$ = *The Effective Radiated Power taking relative gain and main-beam calculations into account. (milliwatts)*

R = *The radial distance from antenna to mobile unit (cm)*

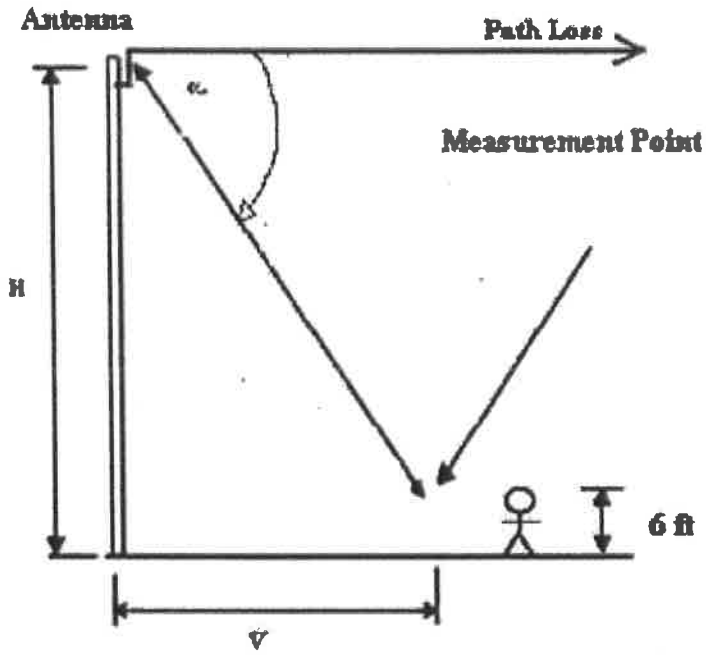
V = *The horizontal distance between site and mobile unit (cm)*

Δh = *The antenna height minus the measurement point (cm)*

α = *The elevation angle between the main beam of the antenna and any point of reference away from the antenna support structure (degrees)*

Pattern (α) = *The vertical antenna gain at the specified angle α (dBd)*

Max Antenna Gain = *The maximum antenna gain (dBd)*



Please note that calculations were performed using the techniques and procedures outlined in the FCC OET Bulletin No. 65 with particular emphasis on the pattern of antennas and the number of channels per sector.

Federal Regulations

The licensee planning to operate on the proposed monopole falls under the jurisdiction of the FCC. Under the authority granted by the Telecommunications Act of 1996 (and stated in Title 47 CFR, Part 1, Section 1307 b), the FCC has mandated that all FCC licensees must be in compliance with RF Emissions guidelines, as defined in OET Bulletin 65, no later than September 1, 2000.

Additionally, as of 1997 the FCC had already made compliance with OET Bulletin 65, a prerequisite for new Common Carrier station authorization. Applicable standards for this analysis will be discussed below.

Table 2a – Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Power Density (mw/cm^2)	Averaging Time (minutes)
0.3 – 3	100 *	6
3 – 30	$(900/f^2)$ *	6
30 – 300	1	6
300 – 1500	f/300	6
1500 – 100000	5	6

Where: f = Frequency in MHz
* indicates Plane-wave equivalent power density

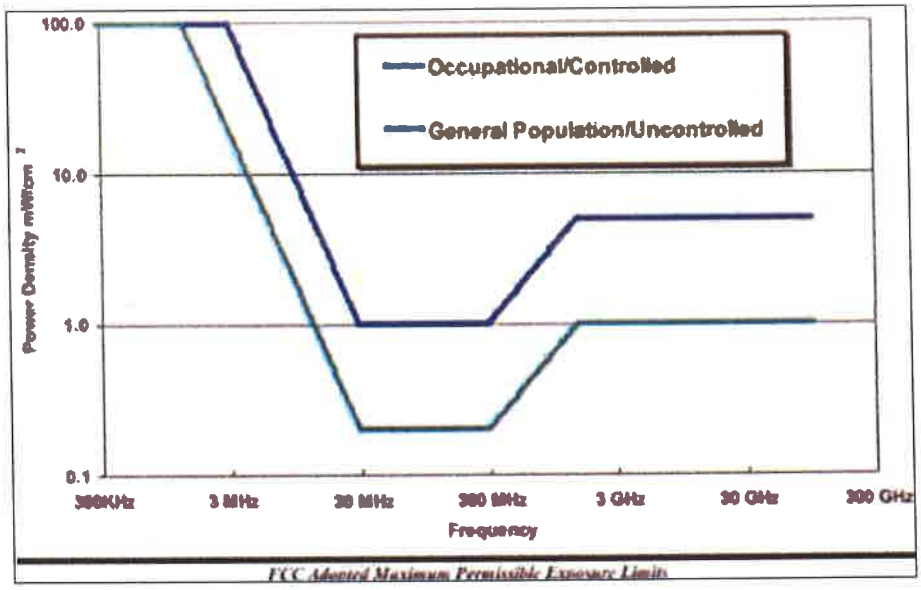
Table 2b – Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Power Density (mw/cm^2)	Averaging Time (minutes)
0.3 - 1.34	100 *	30
1.34 – 30	$(180/f^2)$ *	30
30 – 300	0.2	30
300 – 1500	f/1500	30
1500 – 100000	1	30

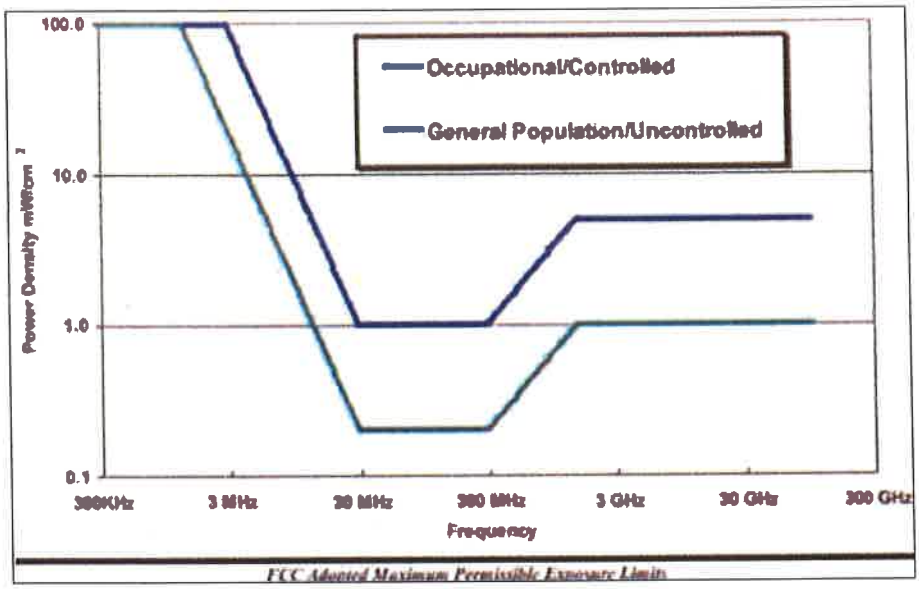
Where: f = Frequency in MHz
* indicates Plane-wave equivalent power density

In general, as specified in 47 C.F.R. 1.1307(b), as amended, when the FCC's guidelines are exceeded in an accessible area due to the emissions from multiple fixed transmitters, the following policy applies. Actions necessary to bring the area into compliance with the guidelines are the shared responsibility of all licensees whose transmitter's contribution to the RF environment at the non-complying area exceeds 5% of the exposure limit that applies to their particular transmitter.

The figure below provides a graphical illustration of both the FCC's occupational and general population MPE limits.



The figure below provides a graphical illustration of both the FCC's occupational and general population MPE limits.



CONCLUSIONS

Table 3 (below) shows the calculated maximum power density levels in the environment immediately surrounding the proposed monopole, as measured 26 feet above ground level for a person standing on a nearby structure rooftop. The total uncontrolled maximum public power density level of 7.6111 % is calculated for 26 feet above ground level, which occurs at distance of 425 feet away from the proposed site on the roof of a building. This level is well within permitted FCC limits for general public exposure. From this analysis, it can be seen the Maximum Power Density predicted from the Verizon proposed site is significantly below the FCC standard for both Controlled and Uncontrolled environments. Please note that the power densities calculated for this analysis are a worst case example, as it has been assumed that all transmitters are constantly in continuous operation and provides for expansion channels which may not be present today.

Table 3 – Individual Predicted MPE Levels & Standards (Verizon)

	VERIZON @ 132 FT (700 MHZ)	VERIZON @ 132 FT (850 MHZ)	VERIZON @ 132 FT (1950 MHZ)	VERIZON @ 132 FT (2100 MHZ)	VERIZON @ 132 FT (3800 MHZ)
Max. Power Density (mw/cm^2)	**0.0014**	**0.0007**	**< 0.0001**	**< 0.0001**	**0.0721**
MPE Limit for Power Density in a Controlled Environment (mw/cm^2)	**2.5000**	**2.8333**	**5.0000**	**5.0000**	**5.0000**
% of MPE limit for Power Density in a Controlled Environment	**0.0561 %**	**0.0243 %**	**0.0001 %**	**0.0000 %**	**1.4417 %**
MPE Limit for Power Density in an Uncontrolled Environment (mw/cm^2)	**0.5000**	**0.5667**	**1.00000**	**1.00000**	**1.00000**
% of MPE limit for Power Density in an Uncontrolled Environment	**0.2806 %**	**0.1215 %**	**0.0005 %**	**0.0002 %**	**7.2083 %**

The % MPE limit for Power Density for the entire site is the sum total of the % of MPE limit for Power Density of each individual emitter on the proposed monopole. Table 5 (below) shows the aggregate values for the proposed configuration on the proposed site.

Table 5 - Aggregate MPE Levels and Percentages

STANDARD	Controlled Environment	Uncontrolled Environment
VERIZON @ 132 FT (750MHZ)	0.0561%	0.2806 %
VERIZON @ 132 FT (850 MHZ)	0.0243 %	0.1215 %
VERIZON @ 132 FT (1950 MHZ)	0.0001 %	0.0005 %
VERIZON @ 132 FT (2100 MHZ)	0.0000 %	0.0002 %
VERIZON @ 132 FT (3800 MHZ)	1.4417 %	7.2083 %
TOTAL	1.5222 %	7.6111 %

Certification

V-COMM, L.L.C. hereby certifies that the site studied in this analysis complies with FCC mandated RF Emission MPE requirements. V-COMM, L.L.C. also certifies that the above results are based on calculations made using FCC recommended methods, with industry standard assumptions and formulas. All results shown in this report have been reviewed and are accurate within reasonable levels of engineering accuracy.

V-COMM, L.L.C. shall not be held responsible for any inaccuracies in the data supplied by Verizon. V-COMM, L.L.C. assumes that all transmitting equipment is operating within FCC Type Accepted specifications. A comprehensive field survey was not performed prior to the generation of this report. If questions arise regarding the calculations herein, V-COMM, L.L.C. recommends that a comprehensive field survey be performed to resolve any disputes.

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