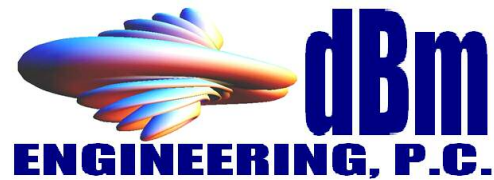


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April 27, 2017
James M. Strong
McNees Wallace & Nurick LLC
100 Pine Street, P.O. Box 1166
Harrisburg, PA 17108-1166

**Subject: Electromagnetic Exposure Analysis
“WHEATLAND”
2200 Noll Drive
Lancaster, PA 17603
Latitude: N 40° 03’ 00.23” (NAD 83)
Longitude: W 76° 21’ 48.77” (NAD 83)
362’ AMSL**

Mr. Strong:

I have received and executed your request that I perform an independent evaluation and certification of the anticipated radio-frequency exposure levels for the Verizon Wireless telecommunications facility proposed at the above referenced coordinates. The intention of this study is to verify compliance with Federal Communications Commission (hereafter “FCC”) guidelines for human exposure limits to radio-frequency electromagnetic fields as per FCC Code of Federal Regulation 47 CFR 1.1307 and 1.1310. As a registered Professional Engineer, I am bound by a code of ethics to hold paramount the safety, health, and welfare of the public. All statements and calculations offered herein are made in an objective and truthful manner pursuant to that code.

Summary of Findings

The maximum exposure to radio-frequency emissions from the proposed Verizon Wireless facility will be far below FCC exposure limits. **Using upper limit assumptions for the Verizon Wireless equipment configuration, the cumulative radio-frequency exposure levels would be at least one-hundred (100) times less than the FCC limits at all locations of public access.** The following chart (Figure-1) specifically illustrates anticipated exposure levels for a variety of scenarios. All exposure limits have been calculated using the methods prescribed in FCC Office of Engineering and Technology (OET) Bulletin 65 “Evaluating Compliance with FCC Guidelines for Human Exposure to Radio-frequency Electromagnetic Fields”. These upper-limit conditions include maximum traffic loading, significant subscriber growth, six degrees of main beam down-tilt, and 100% constructive interference from ground reflection. Additionally, signal attenuation due to environmental clutter such as buildings, trees, and roadways has been ignored which will overestimate actual power densities. Also worth mentioning is the fact that the FCC exposure limits already include a significant margin of safety. Continuous

exposure at 100% of FCC limit is considered by the scientific community to be just as safe as continuous exposure at 1% of FCC limit.

Horizontal Distance from Facility (Ft.)	Height Above Ground (Ft.)	Maximum Power Density $\mu\text{W}/\text{cm}^2$ (micro-watts per square centimeter)						% of FCC Limit						Cumulative % of FCC limit across all bands
		150 MHz	700 MHz	850 MHz	1900 MHz	2100 MHz	2600 MHz	150 MHz	700 MHz	850 MHz	1900 MHz	2100 MHz	2600 MHz	
0	6	N/A	< 0.8	N/A	< 1.3	< 2	N/A	N/A	< 0.17	N/A	< 0.13	< 0.2	N/A	< 0.5
100	6	N/A	< 1.5	N/A	< 2.4	< 3.6	N/A	N/A	< 0.31	N/A	< 0.24	< 0.36	N/A	< 0.91
200	6	N/A	< 0.6	N/A	< 1	< 1.4	N/A	N/A	< 0.12	N/A	< 0.1	< 0.14	N/A	< 0.36
1320 (1/4 mi.)	6	N/A	< 0.1	N/A	< 0.2	< 0.2	N/A	N/A	< 0.02	N/A	< 0.02	< 0.02	N/A	< 0.06
FCC Exposure Limits for General Population		300 $\mu\text{W}/\text{cm}^2$	467 $\mu\text{W}/\text{cm}^2$	567 $\mu\text{W}/\text{cm}^2$	1000 $\mu\text{W}/\text{cm}^2$	1000 $\mu\text{W}/\text{cm}^2$	1000 $\mu\text{W}/\text{cm}^2$							

Figure-1 – calculated exposure levels near the proposed telecommunications facility

Applicability of the National Telecommunications Act of 1996

This Act states that “no state or local government or instrumentality thereof may regulate the placement, construction, and modification of personal wireless service facilities on the basis of the environmental effects of radio-frequency emissions to the extent that such facilities comply with the (Federal Communications) Commission’s regulations concerning such emissions”. As indicated above, this proposed facility will be in full compliance with the FCC’s emissions standards and as such is beyond regulation in that regard.

Technical Parameters of Consideration

The above calculations were based on the equipment configuration information furnished by representatives of Verizon Wireless. Specifically for this installation, Verizon Wireless plans to install up to twelve (12) panel style antennas arranged in three sectors with azimuths evenly spaced in the horizontal plane. The antenna centerline height is planned at 100' above ground level. Transmitting through these antennas will be up to four (4) LTE channels in the 700 MHz band (per sector) at a cumulative maximum of 1200 watts ERP (effective radiated power), up to four (4) LTE channels in the 1900 MHz band (per sector) at a cumulative maximum of 2000 watts ERP (effective radiated power), and up to four (4) LTE channels in the 2100 MHz band (per sector) at a cumulative maximum of 3000 watts ERP (effective radiated power).

Co-location of Other Wireless Providers

In an attempt to halt the proliferation of telecommunications structures and preserve as much of their natural landscape as possible many municipalities have adopted telecommunications ordinances that specifically require new structures to accommodate additional wireless providers from a structural standpoint. **From the standpoint of radio-frequency exposure**, the installation of the proposed Verizon Wireless equipment would in no way preclude the use of this facility by other providers.

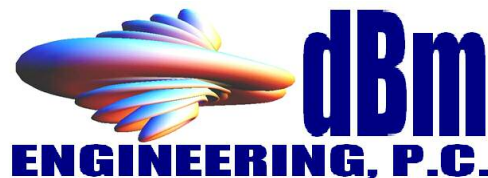
Background Information

In 1985, the FCC first adopted guidelines to be used for evaluating human exposure to RF emissions. The FCC revised and updated these guidelines on August 1, 1996, as a result of a rule-making proceeding initiated in 1993. The new guidelines incorporate limits for Maximum Permissible Exposure (MPE) in terms of electric and magnetic field strength and power density for transmitters operating at frequencies between 300 kHz and 100 GHz.

The FCC's MPE limits are based on exposure limits recommended by the National Council on Radiation Protection and Measurements (NCRP) and, over a wide range of frequencies, the exposure limits were developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI) to replace the 1982 ANSI guidelines. Limits for localized absorption are based on recommendations of both ANSI/IEEE and NCRP.

The FCC's limits, and the NCRP and ANSI/IEEE limits on which they are based, are derived from exposure criteria quantified in terms of specific absorption rate (SAR). The basis for these limits is a whole-body averaged SAR threshold level of 4 watts per kilogram (4 W/kg), as averaged over the entire mass of the body, above which expert organizations have determined that potentially hazardous exposures may occur. The MPE limits are derived by incorporating safety factors that lead, in some cases, to limits that are more conservative than the limits originally adopted by the FCC in 1985. Where

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more conservative limits exist, they do not arise from a fundamental change in the RF safety criteria for whole-body averaged SAR, but from a precautionary desire to protect subgroups of the general population who, potentially, may be more at risk.

The FCC exposure limits are also based on data showing that the human body absorbs RF energy at some frequencies more efficiently than at others. The most restrictive limits occur in the frequency range of 30-300 MHz where whole-body absorption of RF energy by human beings is most efficient. At other frequencies, whole-body absorption is less efficient, and consequently, the MPE limits are less restrictive.

MPE limits are defined in terms of power density (units of milliwatts per centimeter squared: mW/cm^2), electric field strength (units of volts per meter: V/m) and magnetic field strength (units of amperes per meter: A/m). The far-field of a transmitting antenna is where the electric field vector (E), the magnetic field vector (H), and the direction of propagation can be considered to be all mutually orthogonal ("plane-wave" conditions).

Occupational / controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits, as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

General population / uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment-related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area. **In the case of this study, the general population exposure limits have been applied as they are the more conservative set of standards.**

Additional Remarks

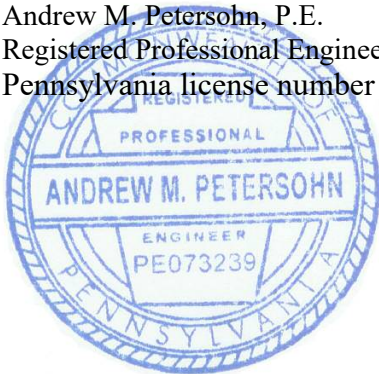
The radio-frequency emission levels from Verizon Wireless and other PCS and Cellular communications base stations are similar to that of other two-way communications systems like those used by police, fire and ambulance personnel. In contrast, commercial broadcast systems like television and radio often transmit at power levels ten times greater or more than the systems discussed above.

The biological effects on humans of non-ionizing radio-frequency exposure have been studied extensively now for decades. There have been thousands of reports produced by government agencies, universities, and private research groups that support the standards adopted by the FCC. **To date, there have been no credible studies conducted whose results showed evidence of any adverse health effects at the above exposure limits.**

Sincerely,



Andrew M. Petersohn, P.E.
Registered Professional Engineer
Pennsylvania license number 073239



DECLARATION OF ENGINEER

Andrew M. Petersohn, P.E., hereby states that he is a graduate telecommunications consulting engineer possessing Master and Bachelor Degrees in Electrical Engineering from Lehigh University (2005 and 1999, respectively). His corporation, dBm Engineering, P.C., has been retained by representatives of Verizon Wireless to perform an electromagnetic emissions analysis for a proposed telecommunications facility.

Mr. Petersohn also asserts that the calculations and/or measurements described in this report were made personally and in a truthful and objective manner. Mr. Petersohn is a Registered Professional Engineer licensed in Pennsylvania, Delaware, Maryland, Virginia, New York, and New Jersey. He has over a decade of engineering experience in the field of wireless communications. Mr. Petersohn is an active member of the National Society of Professional Engineers (NSPE) and the Institute of Electronic and Electrical Engineers (IEEE). Mr. Petersohn further states that all facts and statements contained in the foregoing document are true and accurate to the best of his knowledge. He believes, under penalty of perjury, the foregoing to be correct.



Andrew M. Petersohn, P.E.
Registered Professional Engineer
Pennsylvania license number 073239



Executed this the 27th day of April, 2017.

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