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Radio Frequency Emissions Compliance Report For T-Mobile

Site Name:	Notre Dame Prep HS (826319)	Site Structure Type:	Light Pole
Address:	9701 East Bell Road Scottsdale, Arizona	Latitude:	33.637185
Report Date:	November 17, 2016	Longitude:	-111.870255
		Project:	700 MHz Modification

General Summary

T-Mobile has contracted Waterford Consultants, LLC to conduct a Radio Frequency Electromagnetic Compliance assessment of the proposed modification of the Notre Dame Prep HS (826319) site located at 9701 East Bell Road, Scottsdale, Arizona. This report contains information about the radio telecommunications equipment to be installed at this site and the surrounding environment with regard to RF Hazard compliance. This assessment is based on installation designs and operational parameters provided by T-Mobile.

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.

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)

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.

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 particular location given the spatial orientation and operating parameters of multiple RF sources. These theoretical results represent worst-case predictions as emitters are assumed to be operating at 100% duty cycle.

For any area in excess of 100% General Population MPE, access controls with appropriate RF alerting signage must be put in place and maintained to restrict access to authorized personnel. Signage must be posted to be visible upon approach from any direction to provide notification of potential conditions within these areas. Subject to other site security requirements, occupational personnel should be trained in RF safety and equipped with personal protective equipment (e.g. RF personal monitor) designed for safe work in the vicinity of RF emitters. Controls such as physical barriers to entry imposed by locked doors, hatches and ladders or other access control mechanisms may be supplemented by alarms that alert the individual and notify site management of a breach in access control. Waterford Consultants, LLC recommends that any work activity in these designated areas or in front of any transmitting antennas be coordinated with all wireless tenants.

Analysis

T-Mobile proposes to enhance voice and data services to surrounding areas in licensed 1900 MHz bands with new operations in the 700 MHz band. The antennas will be mounted on an existing light pole with centerlines at 50 and 59 feet above ground level. The antennas will be oriented toward 0, 120 and 240 degrees. The Effective Radiated Power (ERP) in any direction from all T-Mobile operations will not exceed 7,947 Watts. Other appurtenances such as GPS antennas, RRUs and hybrid cable are not sources of RF emissions. Panel antennas have been installed at an adjacent light pole by another wireless operator. Assumed operating parameters for these antennas are listed in Appendix A.

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, serve 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 T-Mobile operations is 0.5955% of the FCC General Population limits. Based on the operating parameters in Appendix A, the cumulative power density level at this location from all antennas is 0.7860% of the FCC General Population limits. Incident at adjacent buildings depicted in Figure 1, the maximum predicted power density level resulting from all T-Mobile operations is 4.386% of the FCC General Population limits. Based on the operating parameters in Appendix A, the cumulative power density level at this location from all antennas is 4.980% of the FCC General Population limits. The proposed operation will not expose members of the General Public to hazardous levels of RF energy and will not contribute to existing cumulative MPE levels on walkable surfaces at ground or at adjacent buildings by 5% of the General Population limits.

Directly in front of the antennas mounted on the light pole, the maximum predicted power density level resulting from all T-Mobile operations is 735.26% of the FCC Occupational limits (3,676.3% of the FCC General Population limits). Based on the operating parameters in Appendix A, the cumulative power density level at this location from all antennas is 735.34% of the FCC Occupational limits (3676.7% of the FCC General Population limits). RF alerting signs (Caution) should be posted on the light pole to be visible upon approach by authorized climbers to provide notification of potential conditions at the antennas. This recommendation is depicted in Figure 2. Any work activity in front of transmitting antennas should be coordinated with T-Mobile.



Figure 1: Antenna Locations

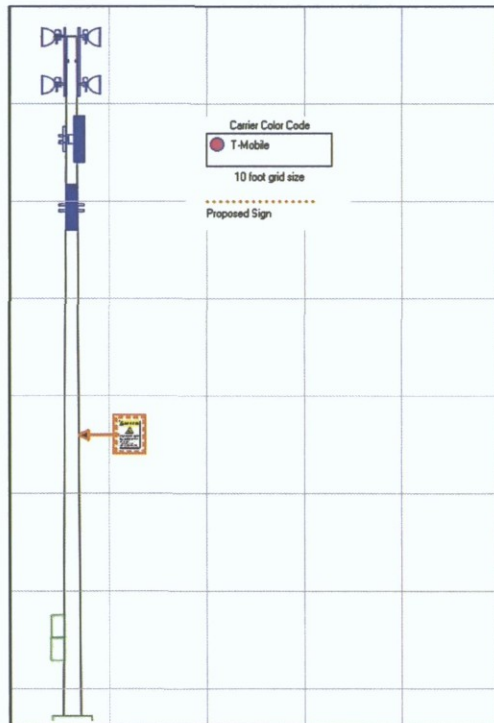


Figure 2: Mitigation Recommendations

Compliance Statement

Based on information provided by T-Mobile, predictive modeling and the mitigation action to be implemented by T-Mobile, the installation proposed by T-Mobile at 9701 East Bell Road, Scottsdale, Arizona will be compliant with Radiofrequency Radiation Exposure Limits of 47 C.F.R. § 1.1307(b)(3) and 1.1310. RF alerting signage and restricting access to elevated work areas on the pole to authorized personnel that have completed RF safety training is required for Occupational environment compliance.

Certification

I, Steven N. Baier-Anderson, 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.



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Appendix A: Assumed Parameters for Antennas Installed by Other Operators

Ant Num	Name	Freq (MHz)	ERP (W)	Model	Rad Center (ft AGL)	Gain (dbd)	Orientation (Deg)	Horizontal Beam Width (Deg)	Antenna Length (ft)
7	Unknown	700	1598	Panel	49	11.2	0	66	5
7	Unknown	850	2216	Panel	49	11.4	0	61	5
8	Unknown	1900	3296	Panel	59	14.4	0	65	5
8	Unknown	2100	3145	Panel	59	14.2	0	62	5
9	Unknown	700	1598	Panel	49	11.2	120	66	5
9	Unknown	850	2216	Panel	49	11.4	120	61	5
10	Unknown	1900	3296	Panel	59	14.4	120	65	5
10	Unknown	2100	3145	Panel	59	14.2	120	62	5
11	Unknown	700	1598	Panel	49	11.2	240	66	5
11	Unknown	850	2216	Panel	49	11.4	240	61	5
12	Unknown	1900	3296	Panel	59	14.4	240	65	5
12	Unknown	2100	3145	Panel	59	14.2	240	62	5