Radio Frequency – Electromagnetic Energy (RF-EME) Compliance Report

Prepared for:
MetroPCS
1080 Marina Village Parkway
4th Floor
Alameda, CA 94501

Site No. SF0250
SS Race Track
Alameda County
37.895499; -122.308999 NAD83
tower

EBI Project No. 62122850
July 19, 2012

EBI CONSULTING
Creating Value for Your Business

EXECUTIVE SUMMARY

Purpose of Report

EnviroBusiness Inc. (dba EBI Consulting) has been contracted by MetroPCS to conduct radio frequency electromagnetic (RF-EME) modeling for MetroPCS Site SF0250 located at 650 Cleveland Avenue in Albany, CA to determine RF-EME exposure levels from existing and existing MetroPCS wireless communications equipment at this site. As described in greater detail in Section 11.0 of this report, the Federal Communications Commission (FCC) has developed Maximum Permissible Exposure (MPE) Limits for general public exposures and occupational exposures. This report summarizes the results of RF-EME modeling in relation to relevant FCC RF-EME compliance standards for limiting human exposure to RF-EME fields.

this report contains a detailed summary of the RF EME analysis for the site.

This document addresses the compliance of MetroPCS's proposed transmitting facilities independently and in relation to all collocated facilities at the site.

1.0 LOCATION OF ALL EXISTING ANTENNAS AND FACILITIES AND EXISTING RF LEVELS

This project involves the installation of one (1) MetroPCS microwave dish on a tower located at 650 Cleveland Avenue in Albany, CA. There are also four (6) MetroPCS wireless telecommunication panel antennas on the tower. There are two Sectors (A and B) of panel antennas existing at the site, with two (2) antennas that are installed per sector.

Based on drawings and aerial photography review an additional carrier also has wireless antennas on the tower. These antennas were included in the modeling analysis

2.0 LOCATION OR ALL APPROVED (BUT NOT INSTALLED) ANTENNAS AND FACILITIES AND EXPECTED RF LEVELS FROM THE APPROVED FACILITIES

There are no antennas or facilities that are approved and not installed based on information provided to EBI and MetroPCS at the time of this report.

3.0 NUMBER AND TYPES OF WTS WITHIN 100 FEET OF THE PROPOSED SITE AND ESTIMATES OF CUMULATIVE EMR EMISSIONS AT THE PROPOSED SITE

With the exception of the antennas mentioned in Section 1.0, there are no other Wireless Telecommunication Service (WTS) sites observed within 100 feet of the proposed site.

LOCATION AND NUMBER OF THE METROPCS ANTENNAS AND BACK-UP FACILITIES PER BUILDING AND NUMBER AND LOCATION OF OTHER TELECOMMUNICATION FACILITIES ON THE PROPERTY

This project involves the installation of onw (1) MetroPCS microwave dish on a tower located at 650 Cleveland Avenue in Albany, CA. There is proposed to be one microwave transmitting in the 39300 MHz frequency range. The bottom of the microwave dish will be 49.5 feet above the ground. The microwave will be oriented 17.475° from true north.

There are also four (4) MetroPCS wireless telecommunication panel antennas on the tower. There are two Sectors (A and B) of panel antennas existing at the site, with two (2) antennas that are installed per sector. The MetroPCS antennas will be transmitting in the 1975-1985 MHz and 2135-2140 MHz frequency ranges. To be conservative for modeling purposes it was assumed that the MetroPCS antenans will be transmitting at 1975 MHZ and 2135 MHz. The Sector A antennas are oriented 170° from true north. The Sector B antennas are oriented 350° from true north. The bottoms of the Sector A and B antennas are 47.88 feet above the ground.

Based on drawings and aerial photography review an additional carrier also has wireless antennas on the tower. These antennas were included in the modeling analysis using information provided to EBI and generally accepted industry standards.

4.0 POWER RATING FOR ALL EXISTING AND PROPOSED BACKUP EQUIPMENT SUBJECT TO THE APPLICATION

The operating power for modeling purposes was assumed to be 20 Watts per transmitter for the 1975 MHz panel antenna and there will be two (2) transmitters operating at this frequency per sector. The operating power for modeling purposes was assumed to be 60 Watts per transmitter for the 2135 MHz panel antenna and there will be one (1) transmitter operating at this frequency per sector.

TOTAL NUMBER OF WATTS PER INSTALLATION AND THE TOTAL NUMBER OF WATTS FOR ALL INSTALLATIONS ON THE TOWER

The effective radiated power (ERP) for the 1975 MHz transmitters combined on site is 1,110 Watts. The effective radiated power (ERP) for the 2135 MHz transmitters combined on site is 1,666 Watts. The ERP for the microwave transmitting in the 39300 MHz on site is 870.96 Watts. The ERP for the additional carrier combined on this site was assumed to be 1,368 Watts.

5.0 PREFERRED METHOD OF ATTACHMENT OF PROPOSED ANTENNA

Based on the information provided to EBI, the information indicates that the proposed microwaves are to be pipe mounted to the tower sector frames and operating in the directions, frequencies, and heights mentioned in section 4.0 above.

6.0 ESTIMATED AMBIENT RADIO FREQUENCY FIELDS FOR THE PROPOSED SITE

Based on worst-case predictive modeling, there are no predicted areas on any accessible ground-level walking/working surface related to the existing MetroPCS microwave dishes and existing panel antennas that exceed the FCC's occupational or general public exposure limits at this site. At the nearest walking/working surfaces to the proposed MetroPCS antennas, the maximum power density is 1.00 percent of the FCC's general public limit (0.20 percent of the FCC's occupational limit). The composite exposure level from modeling all other carriers existing on this site combined with MetroPCS's proposed microwaves and existing panel antennas is 2.00 percent of the FCC's general public limit (0.40 percent of the FCC's occupational limit) at the nearest walking/working surface to each antenna. The inputs used in the modeling are summarized in the RoofView® export file presented in Appendix B. Roofview® was used for modeling the panel antennas however RoofView® is not suitable for modeling microwave dishes. Therefore formulas from OET Bulletin 65 were used to calculate a worst-case prediction of the maximum power density (MPE) at ground level and nearest walking surface for the microwave dishes. Power density estimates used for the microwave dishes proposed for installation at this site are included in Appendix C.

7.0 SIGNAGE AT THE FACILITY IDENTIFYING ALL WTS EQUIPMENT AND SAFETY PRECAUTIONS FOR PEOPLE NEARING THE EQUIPMENT AS MAY BE REQUIRED BY THE APPLICABLE FCC ADOPTED STANDARDS (DISCUSS SIGNAGE FOR THOSE WHO SPEAK LANGUAGES OTHER THAN ENGLISH)

Signs are the primary means for control of access to areas where RF exposure levels may potentially exceed the FCC's allowable thresholds for occupational and general public exposure. It is recommended that the existing signage is examined to ensure that proper signage is posted at the compound access gate warning that anyone entering the compound is entering an area where RF energy is present. Additionally, signage should be posted by the tower notifying anyone approaching the antennas that they are entering an area that may exceed the FCC's general public and/or occupational threshold for exposure in close proximity to the antennas

Additionally, there are areas where workers elevated above the rooftop may be exposed to power densities greater than the general population and occupational limits. Workers and the general public should be informed about the presence and locations of antennas and their associated fields.

Access to this site is accomplished via a compound access gate located at the compound entrance. Access to the compound is considered controlled as it is assumed that this compound access gate is always locked. Since this site is considered controlled, the use of additional controls is not recommended or needed.

8.0 STATEMENT ON WHO PRODUCED THIS REPORT AND QUALIFICATIONS

Please see the certifications attached in Appendix A below.

9.0 FEDERAL COMMUNICATIONS COMMISSION (FCC) REQUIREMENTS

The FCC has established Maximum Permissible Exposure (MPE) limits for human exposure to Radiofrequency Electromagnetic (RF-EME) energy fields, 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 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 guidelines incorporate two separate tiers of exposure limits that are based upon occupational/controlled exposure limits (for workers) and general public/uncontrolled exposure limits for members of the general public.

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 public/uncontrolled limits (see below), 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 public/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.

Table 1 and Figure 1 (below), which are included within the FCC's OET Bulletin 65, summarize the MPE limits for RF emissions. These limits are designed to provide a substantial margin of safety. They vary by frequency to take into account the different types of equipment that may be in operation at a particular facility and are "time-averaged" limits to reflect different durations resulting from controlled and uncontrolled exposures.

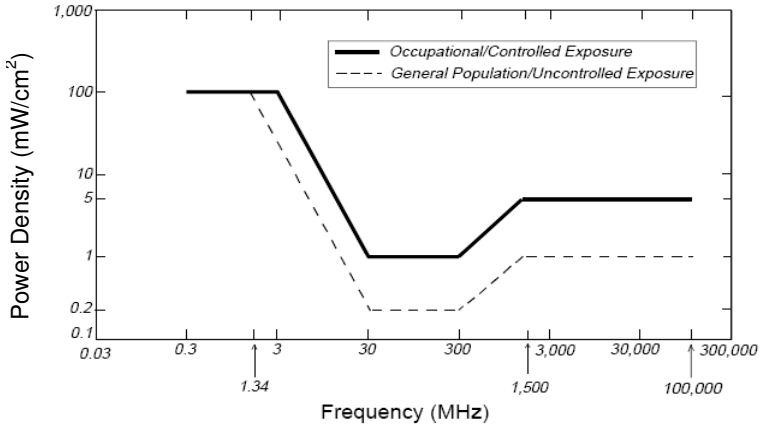
The FCC's MPEs are measured in terms of power (mW) over a unit surface area (cm^2). Known as the power density, the FCC has established an occupational MPE of 5 milliwatts per square centimeter

(mW/cm^2) and an uncontrolled MPE of 1 $mW/cm2$ for equipment operating in the 1975 MHz – 39300 MHz frequency ranges. These limits are considered protective of these populations.

Table 1: Limits for Maximum Permissible Exposure (MPE)				
(A) Limits for Occupational/Controlled Exposure				
Frequency Range (MHz)	**Electric Field Strength (E) (V/m)**	**Magnetic Field Strength (H) (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
300-1,500	--	--	f/300	6
1,500-100,000	--	--	5	6
(B) Limits for General Public/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (E) (V/m)**	**Magnetic Field Strength (H) (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
300-1,500	--	--	f/1,500	30
1,500-100,000	--	--	1.0	30

f = Frequency in (MHz)
* Plane-wave equivalent power density

Figure 1. FCC Limits for Maximum Permissible Exposure (MPE)
Plane-wave Equivalent Power Density



Based on the above, the most restrictive thresholds for exposures of unlimited duration to RF energy for several personal wireless services are summarized below:

Personal Wireless Service	Approximate Frequency	Occupational MPE	Public MPE
Personal Communication (PCS)	1,950 MHz	5.00 mW/cm^2	1.00 mW/cm^2
Cellular Telephone	870 MHz	2.90 mW/cm^2	0.58 mW/cm^2
Specialized Mobile Radio	855 MHz	2.85 mW/cm^2	0.57 mW/cm^2

Personal Wireless Service	Approximate Frequency	Occupational MPE	Public MPE
Most Restrictive Freq, Range	30-300 MHz	1.00 mW/cm^2	0.20 mW/cm^2

MPE limits are designed to provide a substantial margin of safety. These limits apply for continuous exposures and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health.

Personal Communication (PCS) facilities used by MetroPCS in this area operate within a frequency range of 1975-2140 MHz. Facilities typically consist of: 1) electronic transceivers (the radios or cabinets) connected to wired telephone lines; and 2) antennas that send the wireless signals created by the transceivers to be received by individual subscriber units (PCS telephones). Transceivers are typically connected to antennas by coaxial cables.

Because of the short wavelength of PCS services, the antennas require line-of-site paths for good propagation, and are typically installed above ground level. Antennas are constructed to concentrate energy towards the horizon, with as little energy as possible scattered towards the ground or the sky. This design, combined with the low power of PCS facilities, generally results in no possibility for exposure to approach Maximum Permissible Exposure (MPE) levels, with the exception of areas directly in front of the antennas.

Statement of Compliance

A site is considered out of compliance with FCC regulations if there are areas that exceed the FCC exposure limits and there are no RF hazard mitigation measures in place. Any carrier which has an installation that contributes more than 5% of the applicable MPE must participate in mitigating these RF hazards.

10.0 LIMITATIONS

This report was prepared for the use of MetroPCS. It was performed in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same locale under like circumstances. The conclusions provided by EBI are based solely on the information provided by the client. The observations in this report are valid on the date of the investigation. Any additional information that becomes available concerning the site should be provided to EBI so that our conclusions may be revised and modified, if necessary. This report has been prepared in accordance with Standard Conditions for Engagement and authorized proposal, both of which are integral parts of this report. No other warranty, expressed or implied, is made

11.0 SUMMARY AND CONCLUSIONS

EBI has prepared this Radiofrequency Emissions Compliance Report for the existing MetroPCS telecommunications equipment at the site located at 650 Cleveland Avenue in Albany, CA.

EBI has conducted theoretical modeling to estimate the worst-case power density from MetroPCS antennas and the other carriers' existing antennas to document potential MPE levels at this location and ensure that site control measures are adequate to meet FCC and OSHA requirements. As presented in the preceding sections, based on worst-case predictive modeling, there are no modeled exposures on any accessible ground-level walking/working surface related to existing equipment in the area that exceed the FCC's occupational and general public exposure limits at this site. As such, the existing MetroPCS project is in compliance with FCC rules and regulations.

It should be verified that the signage recommendations in Section 9.0 are followed to ensure the site is within full compliance with all federal guidelines for emissions and signage requirements

Appendix A

Certifications

Preparer Certification

I, Scott Heffernan, state that:

- I am an employee of EnviroBusiness Inc. (d/b/a EBI Consulting), which provides RF-EME safety and compliance services to the wireless communications industry.
- I have successfully completed RF-EME safety training, and I am aware of the potential hazards from RF-EME and would be classified "occupational" under the FCC regulations.
- I am familiar with the FCC rules and regulations as well as OSHA regulations both in general and as they apply to RF-EME exposure.
- I have reviewed the data provided by the client and incorporated it into this Site Compliance Report such that the information contained in this report is true and accurate to the best of my knowledge.

Scott Heffernan

Appendix B

Roofview® Export File

StartMapDefinition

Roof Max Y	Roof Max X	Map Max Y	Map Max X	Y Offset	X Offset	Number of envelope			List Of Areas
1	1	200	180	10	30	1	AO210	AO210	AO210

StartSettingsData

Standard	Method	Uptime	Scale Factc	Low Thr	Low Color	Mid Thr	Mid Color	Hi Thr	Hi Color	Over Color	Ap Ht Mult	Ap Ht Method
3	2	3	1	20	1	50	2	100	2	3	1.5	1

StartAntennaData — It is advisable to provide an ID (ant 1) for all antennas

ID	Name	(MHz) Freq	Trans Power	Trans Count	Coax Len	Coax Type	Other Loss	Input Power	Calc Power	Mfg	Model	(ft) X	(ft) Y	(ft) Z	Type	(ft) Aper	dBd Gain	BWdth Pt Dir	Uptime Profile	ON flag
ANT A1	Metro PCS	1900	20	2	70	7/8 LDF	1.46		22.88021	Kathrein	742-445	9.288136	2.220339	47.875	VC	4.25	16	65;170		ON•
ANT A2	Metro PCS	2100	60	1	70	7/8 LDF	1.46		34.32031	Kathrein	742-445	2.694915	5.016949	47.875	VC	4.25	16	65;170		ON•
ANT B1	Metro PCS	1900	20	2	70	7/8 LDF	1.46		22.88021	Kathrein	742-445	2.59322	6.677966	47.875	VC	4.25	16	65;350		ON•
ANT B2	Metro PCS	2100	60	1	70	7/8 LDF	1.46		34.32031	Kathrein	742-445	8.220339	9.864407	47.875	VC	4.25	16	65;350		ON•
Carrier 1 A	Carrier 1	850	25	2	75	7/8 LDF	1.46		28.14946	Decibel	DB844H65	4.016949	2.627119	63	VC	4	13.1	65;180		ON•
Carrier 1 A	Carrier 1	850	25	2	75	7/8 LDF	1.46		28.14946	Decibel	DB844H65	9.338983	2.610169	63	VC	4	13.1	65;180		ON•
Carrier 1 B	Carrier 1	850	25	2	75	7/8 LDF	1.46		28.14946	Decibel	DB844H65	7.338983	10	63	VC	4	13.1	65;330		ON•
Carrier 1 B	Carrier 1	850	25	2	75	7/8 LDF	1.46		28.14946	Decibel	DB844H65	2.762712	7.169492	63	VC	4	13.1	65;330		ON•

StartSymbolData

Sym	Map Marker	Roof X	Roof Y	Map Label	Description (notes for this table only)
Sym		5	35	AC Unit	Sample symbols
Sym		14	5	Roof Access	
Sym		45	5	AC Unit	
Sym		45	20	Ladder	

Appendix C

Microwave Modeling

Estimation of Power Density from Microwave Dishes

Site Number: SF0250A

Total Number of: 1

Tower — Are the antennas installed on a roof or a tower?

Ground — Nearest Walking Surface

Model/Description	Frequency (MHz)	AGL (ft)	ERP (Watts)	Gain (dBd)	Diameter (ft)	Power Density Inside Column (mW/cm2)	Power Density Ground (mW/cm2)	Gen Pop Limit (mW/cm2)	Occ Limit (mW/cm2)	Uncontrolled Outside Column (% MPE)	Controlled Outside Column (% MPE)	Min Dist from Atenna (ft)
ANT2 0.3 38 HP (TR)	39300	50	870.96	40.4	1	0.714138	0.007141	1.000000	5.000000	0.71414%	0.143%	2
						TOTAL	**0.00714138**			**0.71414%**	**0.14%**	**2**

outside of transmitting column, power is ~ 1% of that inside column

" Summary of Nearfield Power Density Calculations for EBI Consulting", July 21, 2006