STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

IN RE:

APPLICATION OF NEW CINGULAR WIRELESS PCS, LLC FOR A CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AND PUBLIC NEED FOR THE CONSTRUCTION, MAINTENANCE AND OPERATION OF A TELECOMMUNICATIONS FACILITY AT 224 LOVELY STREET, AVON, CONNECTICUT	DOCKET 373 MARCH 27, 2009

PRE-FILED TESTIMONY OF ANTHONY WELLS

Q1. Please summarize your professional background in telecommunications.

A. My career in the wireless industry has spanned the past nineteen years initially for wireless service providers including NYNEX Mobile, now Cellco Partnership (d/b/a Verizon Wireless) and Sprint PCS, now Sprint Nextel. In August, 2000, I started my own RF consulting and design business called C Squared Systems ("C Squared"). C Squared currently provides RF design services to the wireless industry throughout New England. I have extensive experience appearing and testifying before the Connecticut Siting Council. A copy of my resume is attached hereto as Exhibit 1.

Q2. Please describe your involvement with Youghiogheny Communications Northeast LLC d/b/a Pocket Wireless.

A. Youghiogheny Communications Northeast LLC d/b/a Pocket Wireless ("Pocket") in a new wireless carrier in the Connecticut marketplace. Pocket launched service in the Hartford market area in January, 2009. C Squared was retained by Pocket to design its network in Connecticut.

Q3. What does your testimony address?

A. The purpose of my testimony is to provide information relating to Pocket's existing network in this area of the state and to describe the need for a proposed facility in the area. This includes information on the general design of Pocket's network, the technical constraints in selecting proposed facilities, and the specific need for a facility at the Site in the above referenced application.

Q4. Please describe Pocket's wireless network in Connecticut.

A. As discussed above, Pocket is a new entrant to the Connecticut marketplace. Pocket is licensed by the Federal Communications Commission to provide PCS service using frequencies in the 2100 MHz range. Pocket currently operates approximately 100 sites in Connecticut, with plans to operate approximately 500 sites. Current efforts are directed to providing signal to areas without coverage. Each new site must be chosen to meet the need for coverage and/or capacity without creating RF interference among sites.

Q5. What requirements does the nature of wireless technology place on Pocket's selection of cell site locations?

A: Like all personal communications service providers, Pocket's wireless network is based on the principle of frequency reuse. Cell site locations must be chosen to provide for sufficient signal strength overlap to allow call hand-off between cells without creating unnecessary duplicative coverage and frequency interference. Terrain variations and local land use policies and development further limit cell site locations.

Technological advances in service, such as the availability of data and video services through customer handsets, are also significant factors in system

development. Increased customer demand and expectations resulting from those advances drive the need for additional sites.

Pocket's required lower limit threshold is -92 dBm, which is expected to provide reliable in-vehicle coverage. A higher threshold level of -85 dBm is the minimum required to provide reliable in-building coverage. At levels below the -92 dBm threshold, signal degradation would be expected to result in areas of unreliable service to Pocket customers for voice and data services. In addition, levels below -92 dBm would adversely affect Pocket's ability to provide reliable E-911 services.

Q6. Please describe Pocket's need for the proposed facility.

A. The interrelationship between the proposed facility and Pocket's existing system (including recently approved but not yet on-air sites) is depicted in the propagation plots attached hereto as Exhibit 2. As shown, Pocket currently experiences a coverage gap in this area of Avon, along Route 177 and the surrounding areas.

Q7. How did Pocket analyze the proposed Site?

A. On behalf of Pocket, C-Squared's RF engineers utilized propagation prediction tools to determine the potential effectiveness of the proposed locations in meeting the identified coverage need. That analysis took into account the coverage objective, Pocket's existing on-air sites in this area and the terrain that exists in this area. The analysis confirmed that a facility would provide service to the target area and would improve service generally within the area. The

analysis also revealed that an antenna center line of 88' AGL at the Site would allow Pocket to achieve the coverage objective levels in this area.

Q8. Please summarize the basis for the height of this proposed facility

A. As indicated above, the results of the analysis conducted for the proposed Avon facility confirmed the minimum height required to fully cover the intended coverage objective is 88' AGL.

Q9. Is adequate coverage necessary to provide consistent and reliable 911 service?

A. Yes. Pocket's installation on the proposed Facility will permit Pocket to provide consistent and reliable E-911 coverage in this area of Avon.

Q10. Have you calculated the RF emission levels for Pocket's installation on the proposed Facility?

Yes. Attached hereto as Exhibit 3 are the calculations concerning Pocket's RF emissions from the proposed Facility. As you can see, operation of Pocket's antennas and equipment on the proposed Facility are well below the maximum power density levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01.

anthony wells

Tony Wells
C Squared Systems

March 27, 2009
Date

EXHIBIT 1

C² Systems
tony.wells@csquaredsystems.com

Resume of: Anthony Wells

EDUCATION:

Northeastern University
Master of Science in Electrical Engineering - Communications and Signal Processing Concentration- June 1997

University of Massachusetts, Lowell
Bachelor of Science in Electrical Engineering - December 1989

EXPERIENCE:

Managing Partner C Squared Systems **8/00 - Present**

- Provide RF and software design services to the wireless industry, including preparation of RF coverage analyses to determine radio frequency signal propagation parameters for siting wireless telecommunications facilities.
- Development of custom data collection and propagation software for in-building and macro networks,
- Manage design of a digital 1900 MHz (PCS) network consisting of over 130 cell site locations in New Hampshire and Maine.
- Design and Implementation of in-building repeater systems for multiple carriers.
- Prepare documentation for and testify before Connecticut Siting Council in support of the location of new wireless communications facilities.
- Provide measurement and calculation reports to comply with conditions of approval for municipalities in Connecticut, relating to Federal Communications Commission guidelines for electromagnetic field exposure.
- Develop radio and microwave frequency electromagnetic field calculation software for use in Federal Communications Commission compliance analysis.
- Design and implement custom software applications and database solutions with mapping capability for wireless providers.
- Provide propagation analysis and optimization of propagation models for use in analysis of propagation characteristics for low antenna heights.

Radar Systems Engineer **Raytheon - 3/98-8/00**

- Developed radar systems and simulation using software languages such as C++, Matlab and FORTRAN.
- Processed radar data for use in analysis of tracking algorithms. Implemented C++ wrapper for Matlab mex-files to reduce processing time by over 70%**.**
- Analyzed results of tracking algorithms. Evaluated statistical cost factors and analyzed radar resource loading in relation to statistical confidence levels for tracking algorithms.
- Calibrated and modified radar simulation software to accurately represent radar hardware performance.

Radio Frequency Manager **Sprint PCS - 10/95 - 3/98**

- Technical Manager responsible for implementation of code division multiple access technology for the New Hampshire and Maine systems.
- Designed and managed a digital 1900 MHz (PCS) network consisting of 70 cell site locations in New Hampshire and Maine.
- Oversaw testing and verification of the network to insure that propagation modeling was accurate and design performed as anticipated.
- Evaluated network performance for vendor compliance with contractual obligations.
- Insured compliance with Federal Communications Commission guidelines for electromagnetic field exposure for the digital network.
- Evaluated and tested accuracy of vendor propagation models and their applicability for use in system design.

Radio Frequency Manager **NYNEX Mobile/Verizon Wireless - 5/90 - 10/95**

- Responsible for the design and performance of an analog 800 MHz communication system consisting of over 200 cell sites in New England.
- Responsible for testing and verification of over 100 cell sites to insure accuracy of propagation models and cell site placement.
- Monitored and improved system performance for the Boston and Rhode Island systems using signal measurement equipment and propagation analysis.
- Evaluated and planned deployment of 800 MHz digital cellular system.
- Evaluated feasibility and integrated high and low power repeaters into the network where applicable.
- Designed microprocessor based automated remote call processing test equipment.
- Implemented repeaters as part of in-building network.
- Managed and optimized frequency plan as part of network optimization.

EXHIBIT 2

Exhibit 1: Hartford - Pocket Network Design Coverage Plan without Proposed Site

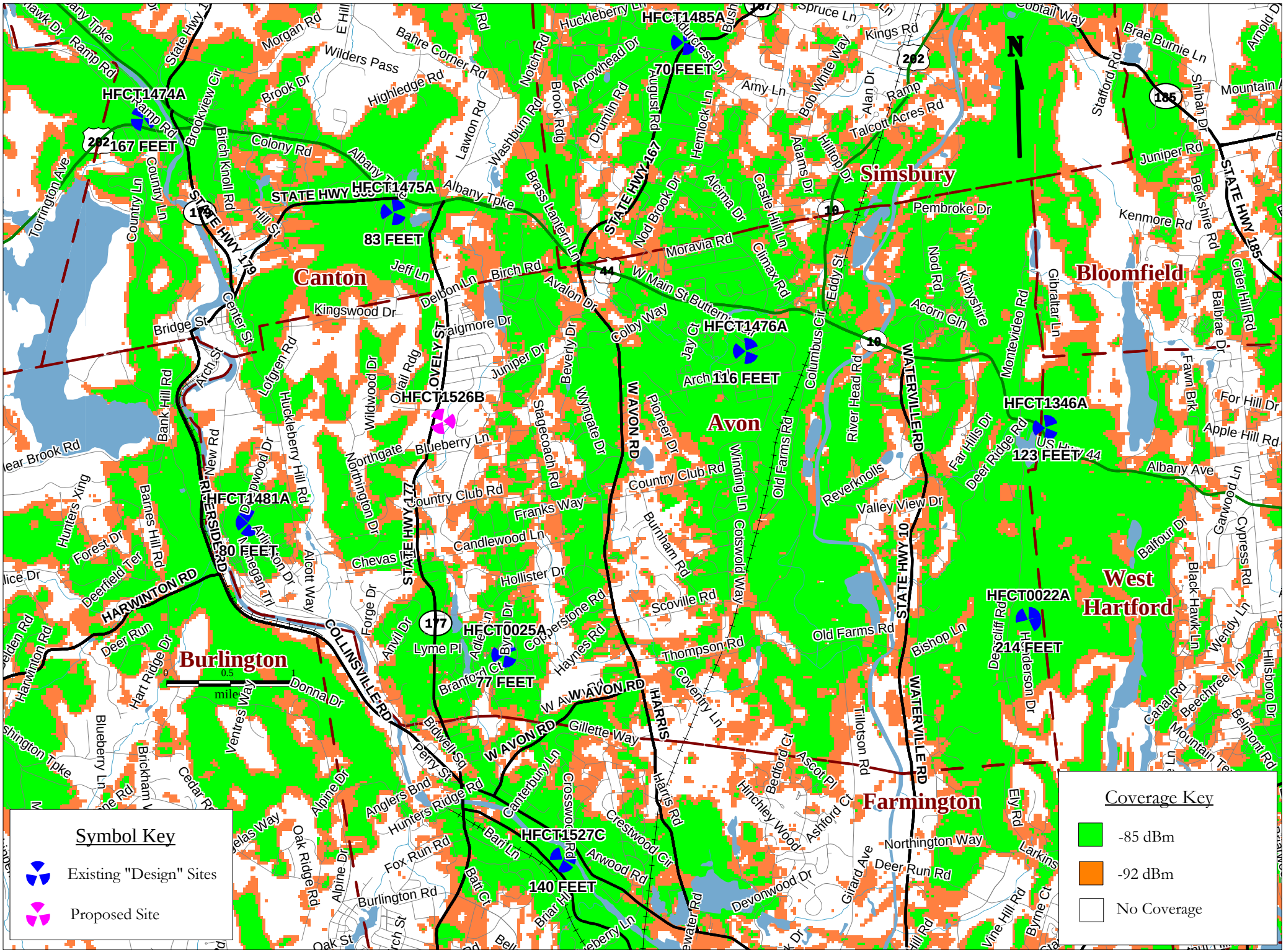


Exhibit 2: Hartford - Isolated Coverage of Proposed Pocket Site HFCT1526B

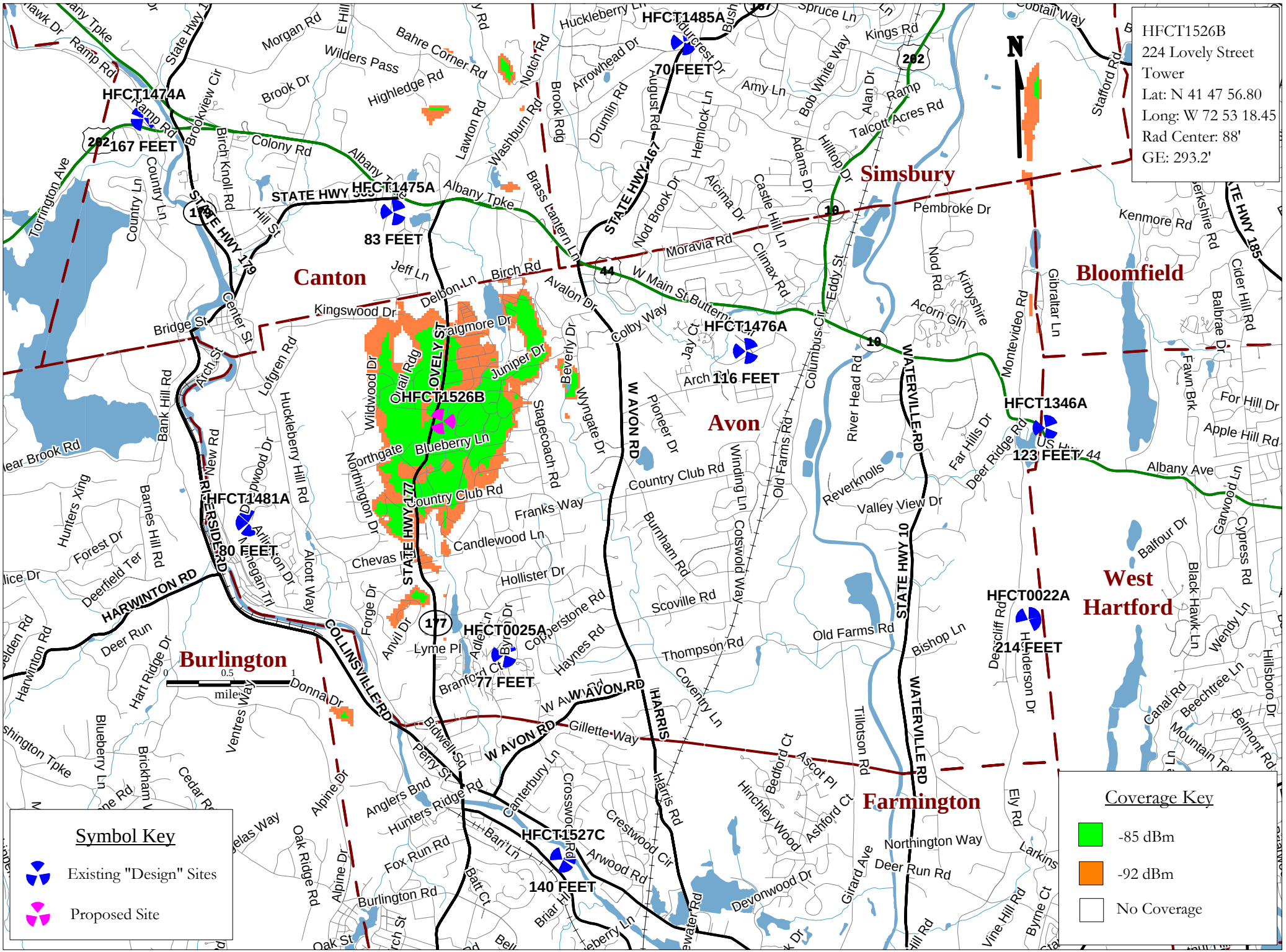


Exhibit 3: Hartford - Pocket Network Design Coverage with Proposed Site HFCT1526B

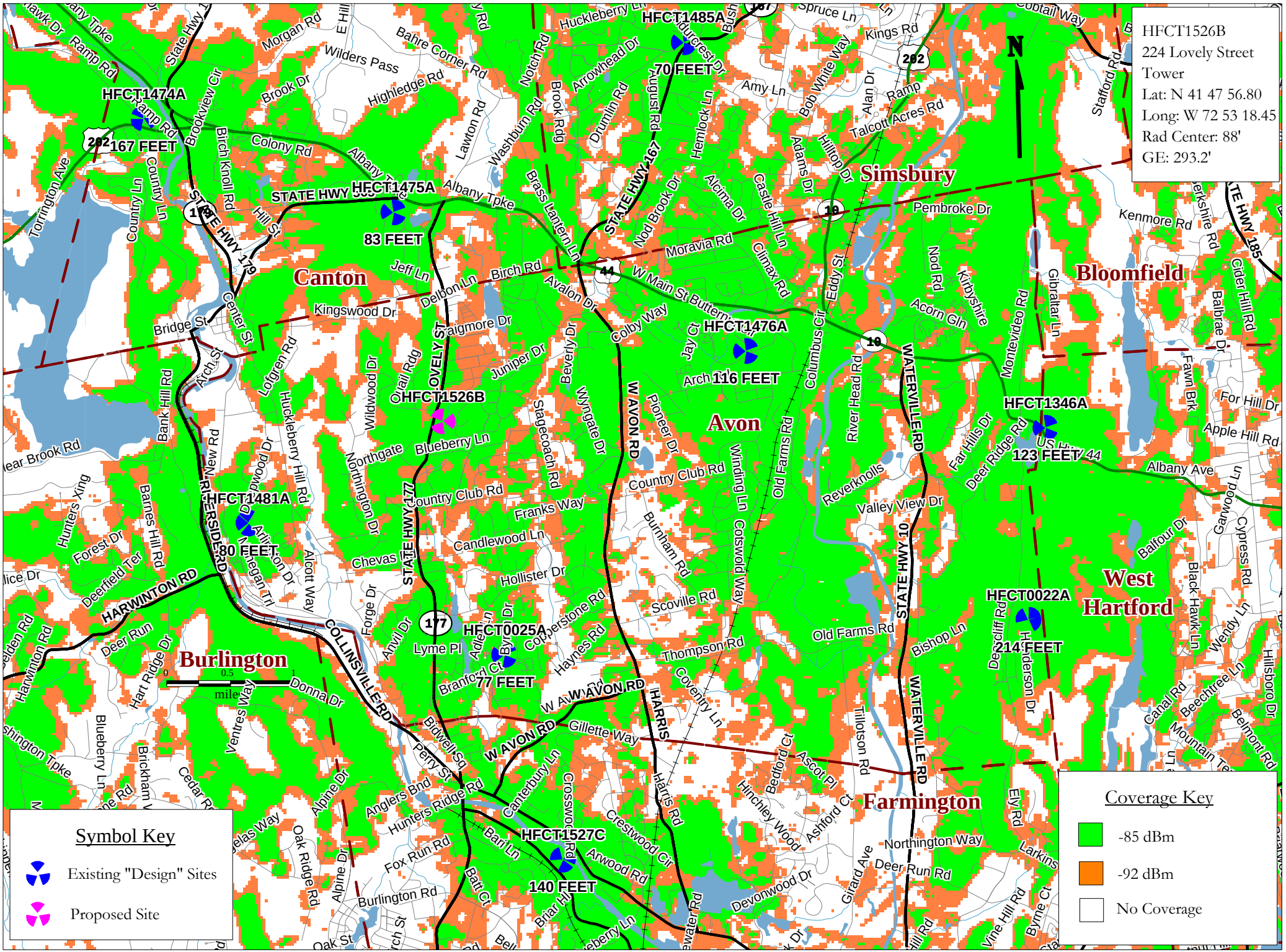


EXHIBIT 3

C Squared Systems, LLC
920 Candia Road
Manchester, NH 03109
Phone: (603) 657 9702
E-mail:
support@csquaredsystems.com

Calculated Radio Frequency Emissions

HFCT1526B

224 Lovely Street, Avon, CT 08001

Table of Contents

List of Tables

1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed Pocket antennas to be installed on the existing building at 224 Lovely Street, Avon, CT 08001.

These calculations assume that the antennas are operating at 100 percent capacity, that all antenna channels are transmitting simultaneously, and that the radio transmitters are operating at full power. Obstructions (trees, buildings etc.) that would normally attenuate the signal are not taken into account. As a result, the predicted signal levels are much more conservative (higher) than the actual signal levels will be from the finished installation.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter (mW/cm^2). The number of mW/cm^2 emitted is called the power density. The general population exposure limit for the cellular band is 0.567-0.593 mW/cm^2, and the general population exposure limit for the PCS/AWS band is 1.0 mW/cm^2. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

The FCC general population / uncontrolled limits set the maximum exposure to which most people may be subjected. General population / uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Higher exposure limits are permitted under the occupational / controlled exposure category, but only for persons who are exposed as a consequence of their employment and who have been made fully aware of the potential for exposure (through training), and they must be able to exercise control over their exposure. General population / uncontrolled limits are five times more stringent than the levels that are acceptable for occupational, or radio frequency trained individuals.

The FCC describes exposure to radio frequency (RF) energy in terms of percentage of maximum permissible exposure (MPE) with 100% being the maximum allowed. Rather than the FCC presenting the user specification in terms of complex power density figures over a specified surface area, this MPE measure is particularly useful, and even more so when considering that power density limits actually vary by frequency because of the different absorptive properties of the human body at different frequencies.

MPE limits are specified as time-averaged exposure limits. This means that exposure can be averaged over 30 minutes for general population / uncontrolled exposure (or 6 minutes for occupational / controlled exposure). However, for the case of exposure of the general public, time averaging is usually not applied because of uncertainties over exact exposure conditions and difficulty in controlling time of exposure. Therefore, the typical conservative approach is to assume that any RF exposure to the general public will be continuous.

Finally, it should be noted that the MPE limits adopted by the FCC for both general population / uncontrolled exposure and for occupational / controlled exposure incorporate a substantial margin of safety and have been established to be well below levels generally accepted as having the potential to cause adverse health effects.

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by OET Bulletin 65 Edition 97-01. These new rules include limits for Maximum Permissible Exposure (MPE) for transmitters operating between 300 kHz and 100 GHz. The FCC MPE limits are based on exposure limits recommended by the National Council on Radiation Protection and Measurements (NCRP), the exposure limits developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI).

Attachment B contains excerpts from OET Bulletin 65 and defines the Maximum Exposure Limit. As shown in these excerpts, each frequency band has different exposure limits, requiring power density to be reported as a percent of Maximum Permissible Exposure (MPE) when dealing with carriers transmitting in different frequency bands.

3. RF Exposure Prediction Methods

The emission field calculation results displayed in the following figures were generated using the following formula as outlined in FCC bulletin OET 65:

$$\text{Power Density} = \left(\frac{0.64 \times EIRP}{\pi \times R^2} \right)$$

Where:

EIRP = Effective Isotropic Radiated Power

R = Radial Distance = $\sqrt{\left(H^2 + V^2\right)}$

H = Horizontal Distance from antenna

V = Vertical Distance from bottom of antenna

0.64 is the ground reflection factor

4. Calculation Results

Table 1 below outlines the contribution of **only** the proposed Pocket installation to the overall power density information for the proposed site.

Carrier	Number of Trans.	Effective Radiated Power (ERP) Per Transmitter (Watts)	Antenna Height (Feet)	Operating Frequency (MHz)	Total ERP (Watts)	Power Density (mw/cm^2)	Limit	%MPE
Pocket	3	631	88	2130-2133.75	1893	0.1012	1.0000	10.12%
							Total	10.12%

Table 1: Proposed Carrier Information

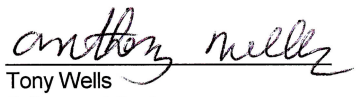
5. Conclusion

The above analysis verifies that emissions from the proposed site will be well below the maximum power density levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Even when using conservative methods, the power density from **only** the proposed Pocket transmit antennas at the existing facility is well below the limits for the general public. The expected percent contribution of the Pocket installation to the overall Maximum Permissible Exposure at the base of the tower is 10.12% of the FCC limit.

Please note that as indicated in the introduction, obstructions (trees, buildings etc.) that would normally attenuate the signal are not taken into account. As a result, the predicted signal levels are more conservative (higher) than the actual signal levels will be from the finished installation.

6. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The calculations follow guidelines set forth in ANSI/IEEE Std. C95.3, ANSI/IEE Std. C95.1 and FCC OET Bulletin 65 Edition 97-01.



Tony Wells
C Squared Systems

Date: March 26, 2009

Attachment A: References

OET Bulletin 65 - Edition 97-01 - August 1997 Federal Communications Commission Office of Engineering & Technology

ANSI C95.1-1982, American National Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300 kHz to 100 GHz. IEEE-SA Standards Board

IEEE Std C95.3-1991 (Reaff 1997), IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave. IEEE-SA Standards Board

Attachment B: FCC Limits For Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/Controlled Exposure

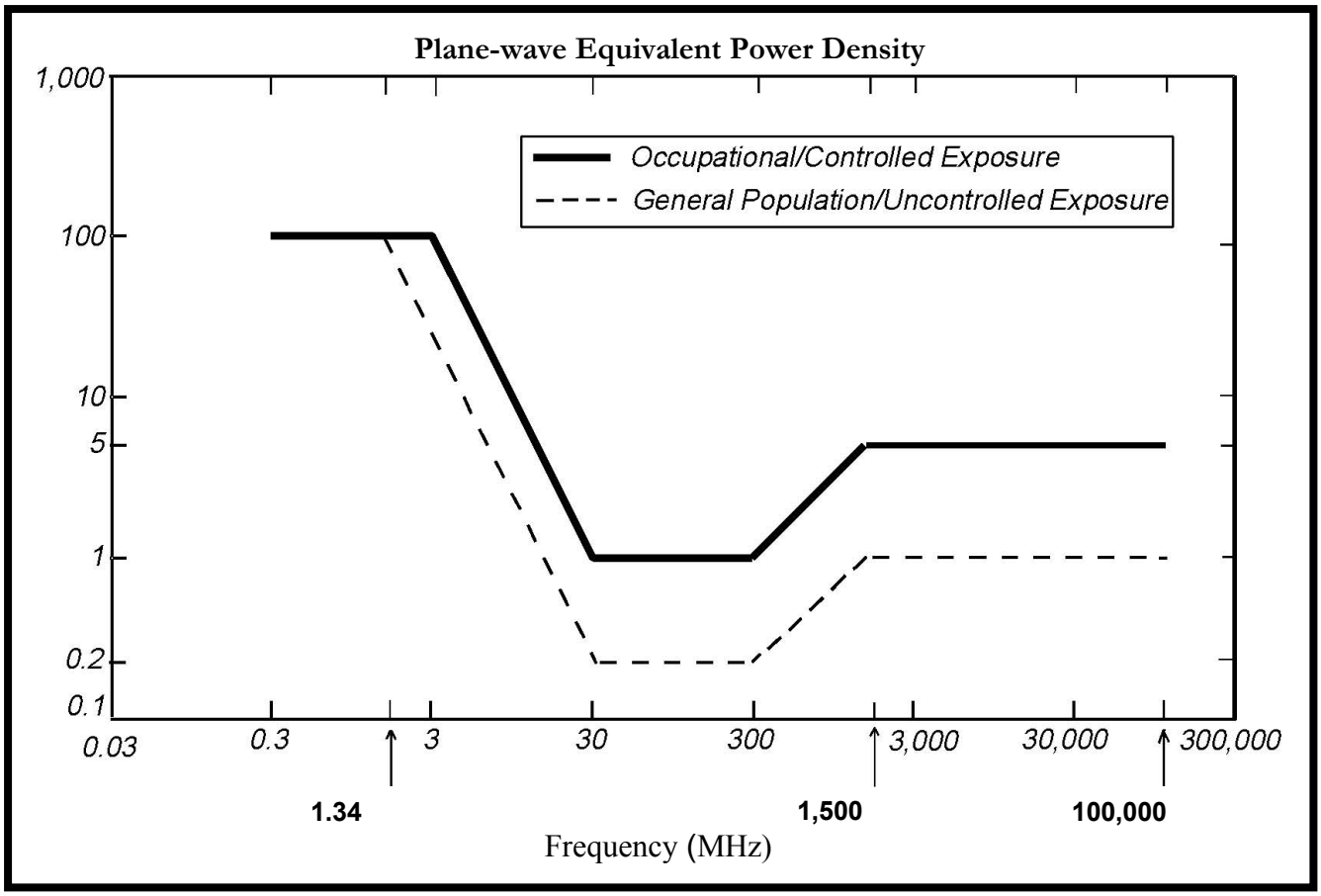
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	$(900/f^2)$*	6
30-300	61.4	0.163	1.0	6
300-1500	-	-	f/300	6
1500-100,000	-	-	5	6

(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (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
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

f = frequency in MHz * Plane-wave equivalent power density

NOTE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.
NOTE 2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.



• FCC Limits for Maximum Permissible Exposure (MPE)