EM-METROPCS-009-090828

ORIGINAL

NOTICE OF INTENT TO MODIFY AN EXISTING TELECOMMUNICATIONS FACILITY AT 11 FRANCIS J. CLARKE CIRCLE, BETHEL, CONNECTICUT

Pursuant to the Public Utility Environmental Standards Act, Connecticut General Statutes § 16-50g et. seq. ("PUESA"), and Sections 16-50j-72(b) and 16-50j-73 of the Regulations of Connecticut State Agencies adopted pursuant to the PUESA, MetroPCS New York, LLC ("MetroPCS") hereby notifies the Connecticut Siting Council of its intent to modify an existing facility located at 11 Francis J. Clarke Circle, Bethel, Connecticut (the "Francis J. Clarke Facility"), owned by SBA Towers, Inc. (the "Tower Owner"). MetroPCS and the Tower Owner have agreed to share the use of the Francis J. Clarke Facility, as detailed below.

The Francis J. Clarke Facility

The Francis J. Clarke Facility is located on the north side of Francis J. Clarke Circle just west of the intersection of 2nd Lane. The site coordinates are Latitude 41° 21' 36.27" and Longitude 73° 25' 30.03".

The Francis J. Clarke Facility obtained its initial approval locally. The facility consists of an approximately one hundred sixty (160) foot monopole (the "Tower") and associated equipment compound currently being used and/or approved for use for wireless communications by Sprint, Nextel, AT&T and Verizon. A chain link fence surrounds the Tower compound.

MetroPCS' Wireless Facility

As shown on the enclosed plans prepared by McGowan Engineering, including a compound plan, antenna mounting/enlarged equipment plan and south elevation plan of the Francis J. Clarke Facility, MetroPCS proposes shared use of the Facility by mounting antennas on the existing Tower and installing unmanned equipment cabinets within the existing fenced compound at grade. MetroPCS will install up to six (6) Kathrein Model 800-10504 panel antennas, or their functional equivalents, at the approximately 117 foot level of the Tower, two GPS antennas and associated equipment including two battery cabinets, a ptc utility cabinet and two radio cabinets on a 10' by 20' concrete pad within the existing fenced compound. As evidenced in the structural analysis report prepared by FDH Engineering, Inc., annexed hereto as Exhibit C, MetroPCS has confirmed that the tower meets the requirements of ANSI/TIA-222-G standards and that provided the foundation was designed and constructed to support he original design reactions, should have the necessary capacity to support the proposed wireless facility.

MetroPCS' Wireless Facility Constitutes An Exempt Modification

The proposed addition of MetroPCS' antennas and equipment to the 11 Francis J. Clarke Facility constitutes an exempt "modification" of an existing facility as defined in Connecticut General Statutes Section 16-50i(d) and Council regulations promulgated pursuant thereto. The addition of MetroPCS' antennas and equipment to the Tower will not result in an increase of the Tower's height nor extend the site boundaries. Further, there will be no increase in noise levels by six (6)

decibels or more at the Tower site's boundary. In addition, MetroPCS' facility will not increase the cumulative radio frequency electromagnetic radiation power density at the Tower site's boundary to or above the standard adopted by the Connecticut Department of Environmental Protection as set forth in Section 22a-162 of the Connecticut General Statutes and MPE limits established by the Federal Communications Commission. As set forth in the Antenna Site FCC RF Compliance Assessment and Report, annexed hereto as Exhibit B, when combining the cumulative "worse case" power density levels for the existing facility with MetroPCS' proposed facility, it would result in a total power density of 0.312% which is well within applicable standards.

For all the foregoing reasons, the addition of MetroPCS' wireless facility to the Tower constitutes an exempt modification which will not have a substantially adverse environmental effect.

Conclusion

Accordingly, MetroPCS requests that the Connecticut Siting Council acknowledge that its proposed modification to the Roxbury Facility meets the Council's exemption criteria.

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(914) 761-1300

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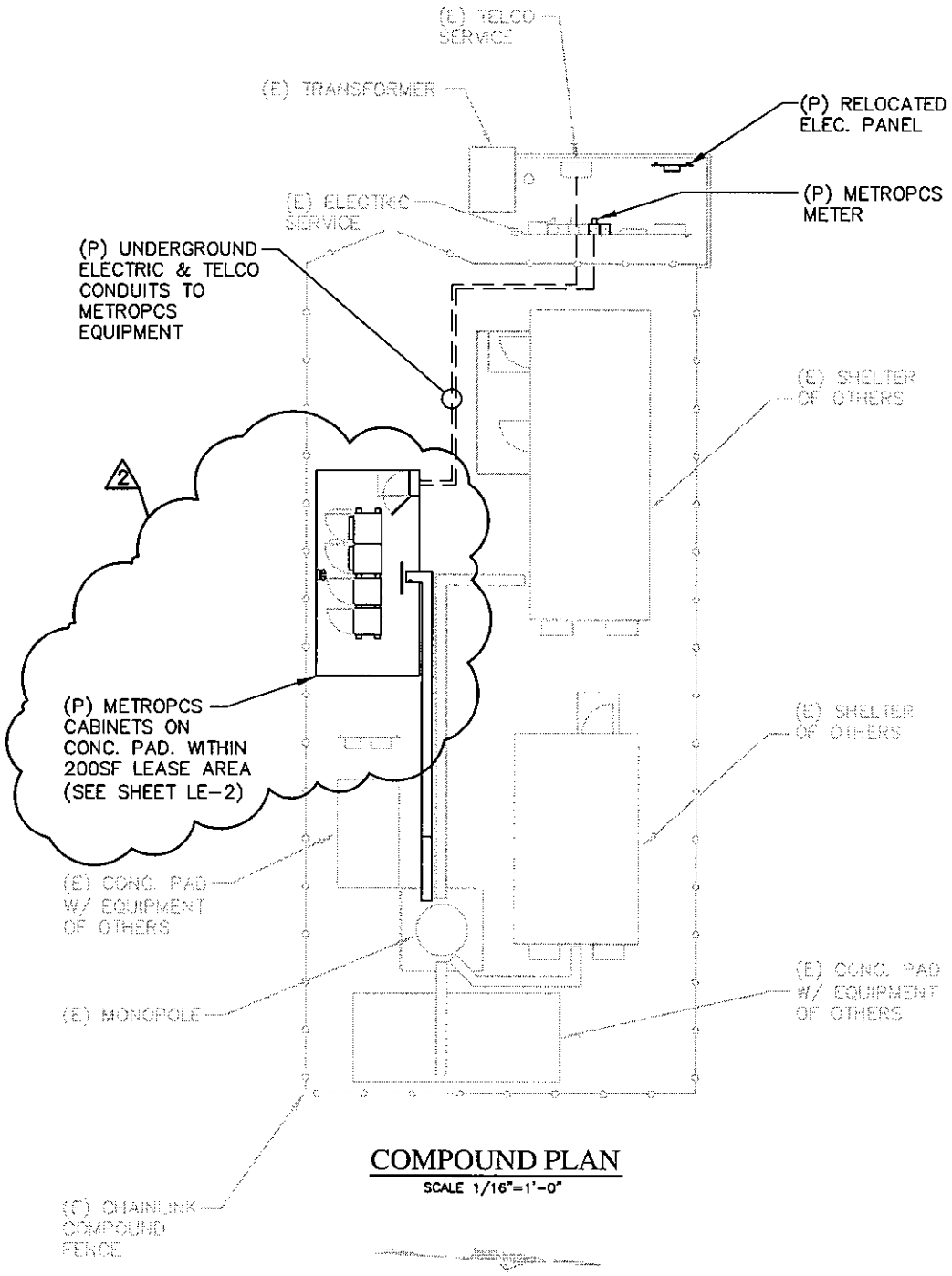
Elizabeth Hornak, MetroPCS
John Coleman, MetroPCS
Erika Vibbert, HPC



COMPOUND PLAN

SCALE 1/16"=1'-0"

REV.	DATE	DESCRIPTION
2	7-31-09	REVISE CONC. PAD AND CABLE TRAY
1	7-27-09	ADD T-ARM MOUNT

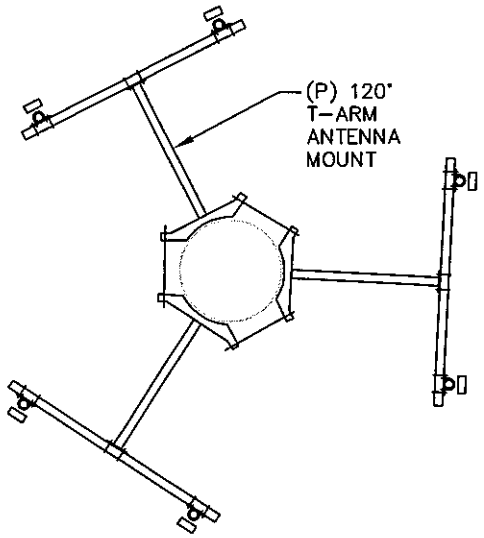
metroPCS
Permission to speak freely

McGOWAN ENGINEERING
645 WESTWOOD AVE.
RIVERVALE, NJ 07675
T: 201-664-5700 F: 201-664-5750

DATE: 7-20-09
DRAWN: AWJ
REVIEWED: MM

SITE #: NY 6311
SITE NAME: BETHEL
SITE ADDRESS: 11 Francis J. Clarke Circle
Bethel, CT 06801

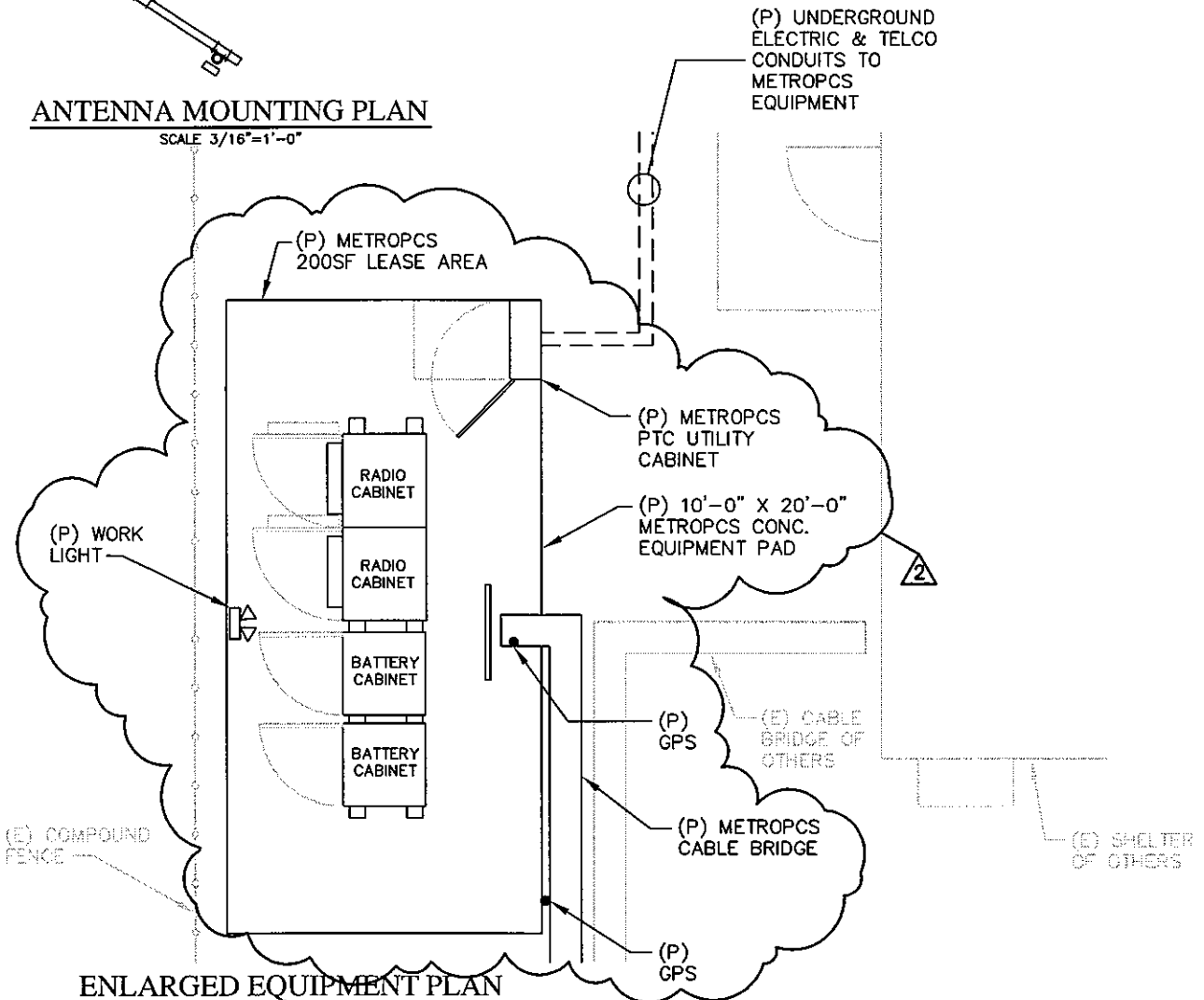
LE-1



ANTENNA NOTES:
PROPOSED METROPCS DESIGN SHALL
BE A TOTAL OF (6) ANTENNAS, (12) 1⅝" ANTENNA CABLES,
(2 ANTENNAS PER SECTOR) WITH A RAD CENTER OF 117'-0".
SBA TOWERS SHALL CONFIRM VIABILITY OF PROPOSED
INSTALLATION AND ADVISE ENGINEER OF REQUIRED CHANGES.

ANTENNA MOUNTING PLAN

SCALE 3/16"=1'-0"



ENLARGED EQUIPMENT PLAN

SCALE 3/16"=1'-0"

REV.	DATE	DESCRIPTION
2	7-31-09	REVISE CONC. PAD AND CABLE TRAY
1	7-27-09	ADD T-ARM MOUNT

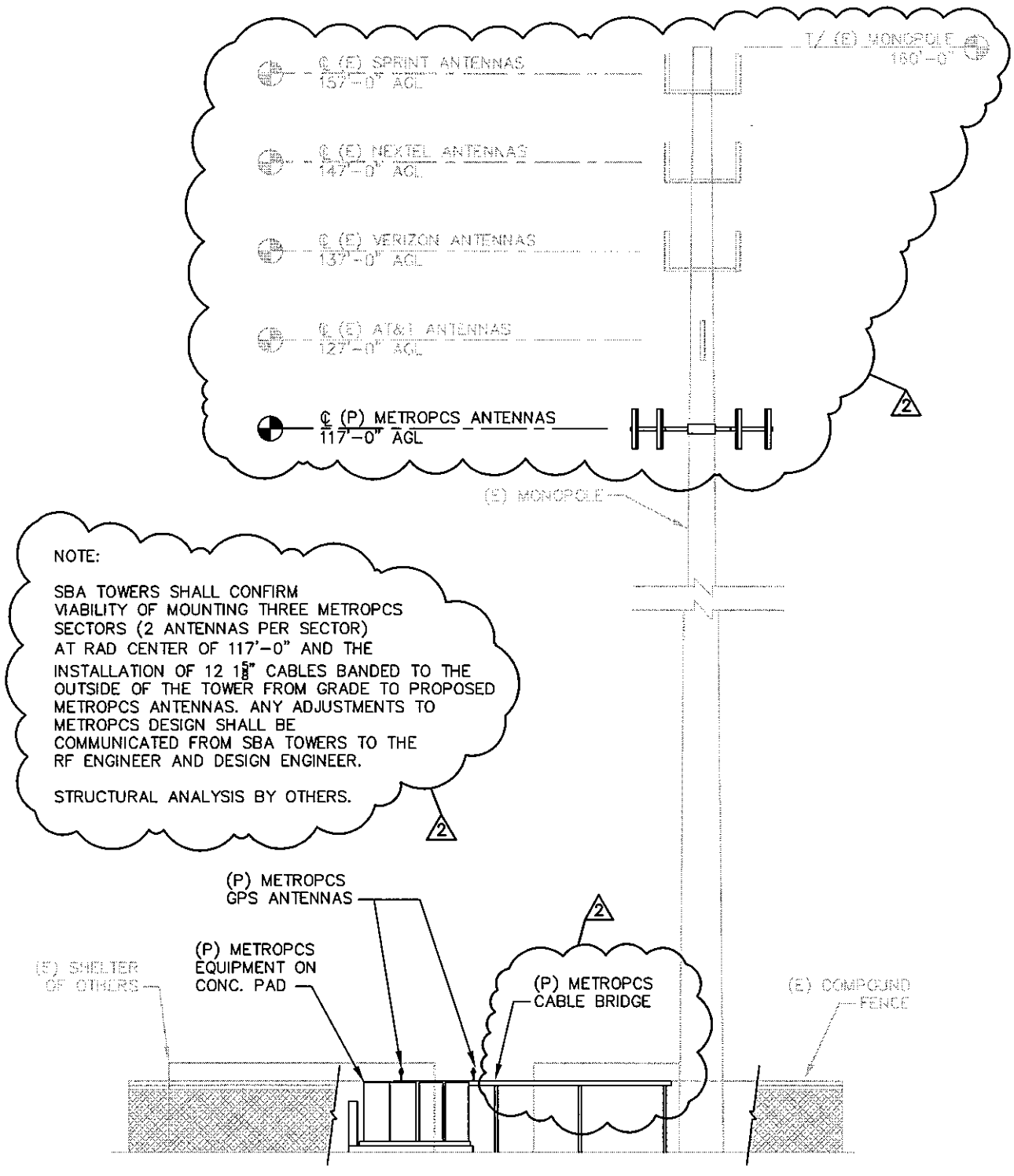
metroPCS
Permission to speak freely

McGOWAN ENGINEERING
645 WESTWOOD AVE.
RIVERVALE, NJ 07675
T: 201-664-5700 F: 201-664-5750

DATE: 7-20-09
DRAWN: AWJ
REVIEWED: MM

SITE #: NY 6311 SITE NAME: BETHEL
SITE ADDRESS: 11 Francis J. Clarke Circle
Bethel, CT 06801

LE-2



SOUTH ELEVATION

SCALE 1/16"=1'-0"

REV.	DATE	DESCRIPTION
2	7-31-09	REVISE CONC. PAD AND CABLE TRAY
1	7-27-09	ADD T-ARM MOUNT

metroPCS
Permission to speak freely

McGOWAN ENGINEERING
645 WESTWOOD AVE.
RIVERVALE, NJ 07675
T: 201-664-5700 F: 201-664-5750

DATE: 7-20-09
DRAWN: AWJ
REVIEWED: MM

SITE #: NY 6311
SITE NAME: BETHEL
SITE ADDRESS: 11 Francis J. Clarke Circle
Bethel, CT 06801

LE-3

Pinnacle Telecom Group

Consulting and Engineering Services

Antenna Site FCC RF Compliance Assessment and Report

MetroPCS

Site NY-6311
11 Francis J. Clarke Circle
Bethel, CT

August 4, 2009

14 Ridgedale Avenue - Suite 209 • Cedar Knolls, NJ 07927 • 973-451-1630

Contents

Introduction and Summary

At the request of MetroPCS, Pinnacle Telecom Group has performed an independent assessment of radiofrequency (RF) levels and related FCC compliance for a proposed wireless base station antenna operation to be added to an existing monopole at 11 Francis J. Clarke Circle in Bethel, CT. MetroPCS refers to the site by the code "NY-6311", and proposes the operation of directional panel antenn as transmitting in the 2130-2140 MHz band.

The FCC requires all wireless operators to perform an assessment of the RF fields emanating from all the transmitting antennas at a site whenever antenna operations are added or modified, and to ensure compliance with the Maximum Permissible Exposure (MPE) limit in the FCC's regulations.

In this case, the FCC compliance assessment needs to incorporate the RF effects of existing antenna operations at the site by AT&T, Nextel, Sprint, and Verizon. Note that FCC regulations require any future antenna collocator to specifically assess and assure continuing FCC compliance based on the overall RF effects of all proposed and then-existing antennas at the site.

This report describes a mathematical analysis of compliance with the FCC MPE limit for safe continuous exposure of the general public. The RF effects of the antennas are calculated using a standard FCC formula – and the analysis is designed to conservatively overstate the RF levels that actually occur from the antennas. In that way, though, as long as the results indicate RF levels below the MPE limit, we can have great confidence the compliance requirement is satisfied.

The results of a compliance assessment can be described in layman's terms by expressing the calculated RF levels as simple percentages of the FCC MPE limit. If the normalized reference for that limit is 100 percent, then calculated RF levels higher than 100 percent indicate the MPE limit is exceeded and there is a need to mitigate the potential exposure. On the other hand, calculated RF levels consistently below 100 percent serve as a clear and sufficient demonstration of

compliance with the MPE limit. We can (and will) also describe the overall worst-case result via the "plain-English" equivalent "times-below-the-limit" factor.

The result of the RF compliance assessment in this case is as follows:

- At street level around the site, the conservatively calculated maximum RF level from the combination of proposed and existing antenna operations is 0.3120 percent (i.e., less than 4/10^{ths} of one percent) of the FCC MPE limit. In other words, the worst-case calculated RF level is more than 320 times below the FCC limit for safe, continuous exposure to the RF emissions from antennas.
- The results of the calculations provide a clear demonstration that the RF levels from the proposed antenna operation will satisfy the applicable criteria for controlling potential human exposure to RF fields, and the RF levels will be in clear compliance with the FCC regulations and limit concerning RF safety. Moreover, because of the conservative methodology and incorporated assumptions, RF levels actually caused by the antennas will be even less significant than the calculation results here indicate.

The remainder of this report provides the following:

- relevant technical data on the proposed MetroPCS antenna operation, as well as the existing antenna operations at the site;
- a description of the applicable FCC mathematical model for assessing MPE compliance, and application of the technical data to that model; and
- the results of the analysis, and the compliance conclusion for the site.

In addition, two Appendices are included. Appendix A provides background on the FCC MPE limit, along with a list of key FCC references on compliance. Appendix B provides a summary of the qualifications of the expert certifying RF compliance for this site.

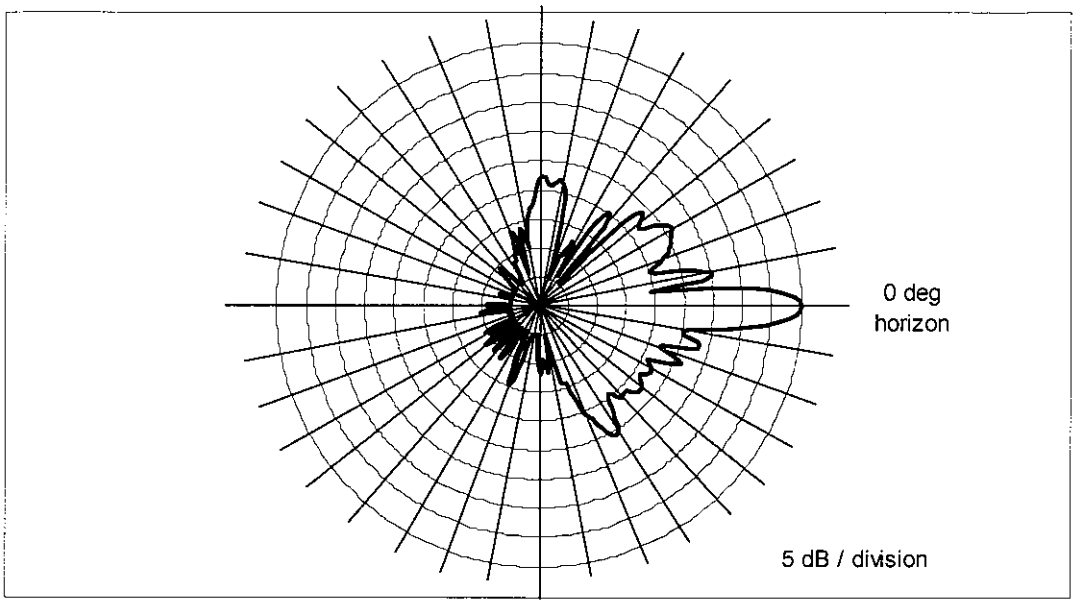
Antenna and Transmission Data

The table on the next page summarizes the relevant technical data for the proposed MetroPCS antenna operation.

Technical Data - MetroPCS	
Frequency Band	2130 - 2140 MHz
Service Coverage Type	Sectorized – with identical transmission and compliance-related parameters
Antenna Type	Directional Panel
Antenna Manufacturer & Model	Kathrein 800-10504 (or equiv.)
Maximum Antenna Gain	17.8 dBi
Antenna Centerline Height AGL	117 ft.
RF Channels per Sector	7
Transmitter Power / RF Channel	24 watts
Antenna Line Loss	Conservatively ignored (assumed 0 dB)

The antenna vertical-plane radiation pattern is used in the calculations of RF levels at ground level around a site. Figure 1 on the next page shows the vertical-plane radiation pattern of the antenna model proposed by MetroPCS. Note that in this type of diagram, the antenna is effectively pointed at the three o'clock position (the horizon) and the relative strength of the pattern at different angles is described using decibel units. The use of a decibel scale to describe the relative pattern at different angles incidentally tends to visually understate the actual focusing effects of the antenna. Where the antenna pattern reads 20 dB, for example, the relative RF energy emitted at the corresponding downward angle is 1/100th of the maximum that occurs in the main beam (at 0 degrees); at a 30 dB point, the level is 1/1,000th of the maximum.

Figure 1. Kathrein 800-10504 Antenna – Vertical-plane Radiation Pattern



As noted at the outset, there are existing antenna operations to include in the compliance assessment. These involve directional panel antennas arranged for sectorized cellular service coverage, and in the analysis for each of the carriers, we will conservatively assume operation with maximum channel capacity and at maximum transmitter power.

AT&T is licensed to operate in both the 850 and 1900 MHz frequency bands. In the 850 MHz band, AT&T uses as many as nine RF channels per antenna sector and a maximum transmitter power of 20 watts. In the 1900 MHz band, AT&T uses as many as three RF channels per antenna sector, with a maximum of 16 watts of transmitter power per channel.

Nextel is licensed to operate in the 851 MHz frequency band. Nextel can use a maximum of 12 RF channels in each sector, and each channel is set for maximum of 100 watts of effective radiated power (for which the equivalent antenna input power is less than six watts).

Sprint is licensed to operate in the 1900 MHz band, and uses a maximum of six RF channels in each antenna sector, with a maximum transmitter power of 16 watts per channel.

Verizon is licensed to operate in both the 850 and 1900 MHz frequency bands. In the 850 MHz band, Verizon uses as many as seven RF channels per antenna sector and a maximum transmitter power of 20 watts. In the 1900 MHz band, Verizon uses as many as three RF channels per antenna sector, with a maximum of 16 watts of transmitter power per channel.

Mathematical Compliance Analysis

FCC Office of Engineering and Technology Bulletin 65 ("OET Bulletin 65") provides guidelines for mathematical models to calculate the RF levels at various points around transmitting antennas. At street-level around an antenna site (in what is called the "far field" of the antennas), the RF levels are directly proportional to the total antenna input power and the relative antenna gain in the downward direction of interest – and the levels are otherwise inversely proportional to the square of the straight-line distance to the antenna. Conservative calculations also assume the potential RF exposure is enhanced by reflection of the RF energy from the ground. Our calculations will assume a 100% "perfect" reflection, the worst-case approach.

The FCC's formula for street-level RF compliance calculations for any given wireless antenna operation is as follows:

$$MPE\% = (100 * TxPower * 10^{(Gmax-Vdisc/10)} * 4) / (MPE * 4\pi * R^2)$$

where

MPE%	=	RF level, expressed as a percentage of the MPE limit applicable to continuous exposure of the general public
100	=	factor to convert the raw result to a percentage
TxPower	=	maximum net power into antenna sector, in milliwatts, a function of the number of channels per sector, the transmitter power per channel, and line loss

$10^{(Gmax-Vdisc/10)}$	=	numeric equivalent of the relative antenna gain in the downward direction of interest, referenced to any applied antenna mechanical downtilt; data on the antenna vertical-plane pattern is taken from manufacturer specifications
4	=	factor to account for a 100-percent-efficient energy reflection from the ground, and the squared relationship between RF field strength and power density ($2^2 = 4$)
MPE	=	FCC general population MPE limit
R	=	straight-line distance from the RF source to the point of interest, centimeters

The MPE% calculations are performed out to a distance of 500 feet from the facility to points 6.5 feet (approximately two meters, the FCC-recommended standing height) off the ground, as illustrated in Figure 2 below.

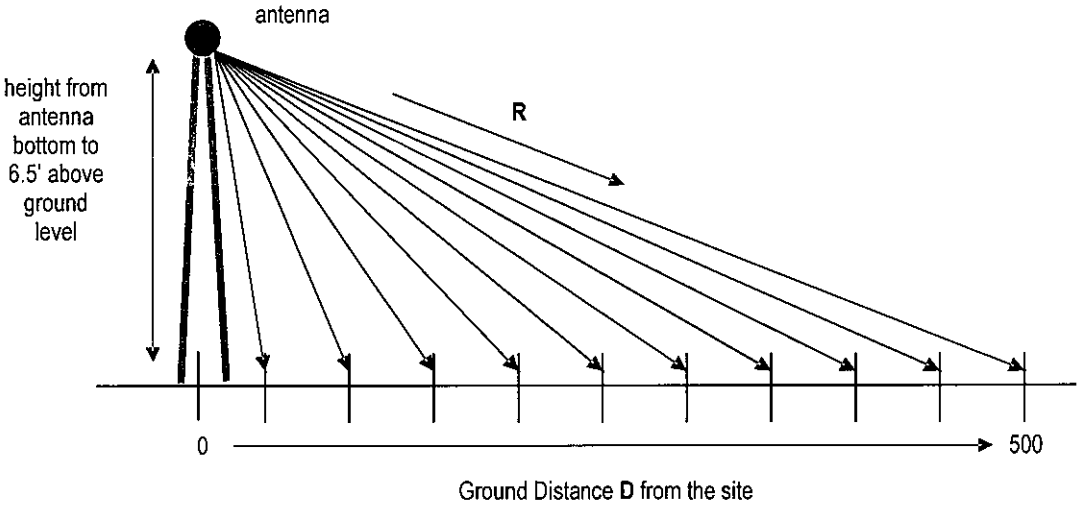


Figure 2. MPE% Calculation Geometry

It is popularly understood that the farther away one is from an antenna, the lower the RF level – which is generally but not universally correct. The results of MPE% calculations fairly close to the site will reflect the variations in the vertical-plane antenna pattern as well as the variation in straight-line distance to the antennas. Therefore, RF levels may actually increase slightly with increasing

distance within the range of zero to 500 feet from the site. As the distance approaches 500 feet and beyond, though, the antenna pattern factor becomes less significant, the RF levels become primarily distance-controlled, and as a result the RF levels generally decrease with increasing distance, and are well understood to be in compliance.

FCC compliance for a collocated antenna site is assessed in the following manner. At each distance point along the ground, an MPE% calculation is made for each antenna operation (including each frequency band), and the sum of the individual MPE% contributions is compared to 100 percent, the normalized reference for compliance with the MPE limit. We refer to the sum of the individual MPE% contributions as "total MPE%", and any calculated total MPE% result exceeding 100 percent is, by definition, higher than the FCC limit and represent non-compliance and a need to mitigate the potential exposure. If all results are consistently below 100 percent, on the other hand, that serves as a demonstration of compliance with the limit.

Note that according to the FCC, when directional antennas and sectorized coverage arrangements are used, the compliance assessments are based on the RF effect of a single antenna sector (or, in cases of non-identical parameters, the worst-case effect of any individual sector).

The following conservative methodology and assumptions are incorporated into the MPE% calculations on a general basis:

1. The antennas are assumed to be operating continuously at maximum power, and at maximum channel capacity. We also ignore the attenuation effects associated with the antenna cabling ("antenna line loss") wherever possible.
2. The power-attenuation effects of shadowing or other obstructions to the line-of-sight path from the antenna to the point of interest are ignored.
3. The calculations intentionally minimize the distance factor (R) by assuming a 6'6" human and performing the calculations from the bottom (rather than the centerline) of the lowest-mounted antenna for each

operator.

4. The potential RF exposure at ground level is assumed to be 100-percent enhanced (increased) via a "perfect" field reflection from the ground itself.

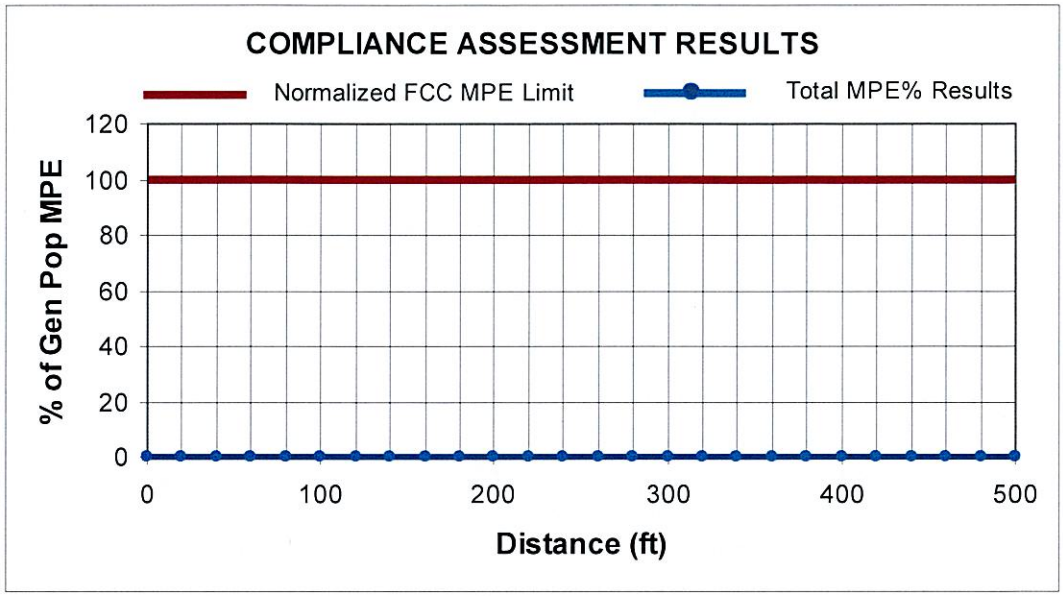
The net result of these assumptions is to significantly overstate the calculated RF exposure levels relative to the levels that will actually occur – and the purpose of this conservatism is to allow very "safe-side" conclusions about compliance.

The table that follows provides the results of the MPE% calculations for each operator, with the worst-case overall result highlighted in bold in the last column.

Ground Dist (ft)	MetroPCS MPE%	AT&T MPE%	Nextel MPE%	Sprint MPE%	Verizon MPE%	Total MPE%
0	0.0117	0.0067	0.0006	0.0061	0.0013	0.0306
20	0.0044	0.0095	0.0006	0.0099	0.0013	0.0329
40	0.0452	0.0214	0.0006	0.0231	0.0012	0.1071
60	0.2376	0.0042	0.0005	0.0169	0.0011	0.2670
80	0.0531	0.0236	0.0018	0.0006	0.0053	0.0875
100	0.0643	0.0197	0.0049	0.0105	0.0123	0.1156
120	0.0665	0.0236	0.0060	0.0031	0.0101	0.1182
140	0.0532	0.0281	0.0019	0.0128	0.0038	0.1141
160	0.0372	0.1033	0.0065	0.0208	0.0388	0.2073
180	0.0403	0.1560	0.0253	0.0042	0.0801	**0.3120**
200	0.0285	0.1146	0.0439	0.0047	0.1002	0.2972
220	0.0227	0.0679	0.0463	0.0112	0.0742	0.2235
240	0.0438	0.0249	0.0295	0.0039	0.0420	0.1481
260	0.0563	0.0076	0.0198	0.0024	0.0107	0.1048
280	0.0437	0.0311	0.0051	0.0104	0.0018	0.0965
300	0.0172	0.0561	0.0009	0.0117	0.0080	0.0954
320	0.0159	0.0797	0.0039	0.0065	0.0361	0.1455
340	0.0254	0.0980	0.0090	0.0022	0.0492	0.1919
360	0.0379	0.1010	0.0159	0.0011	0.0586	0.2276
380	0.0453	0.0961	0.0219	0.0046	0.0597	0.2427
400	0.0412	0.0783	0.0264	0.0114	0.0584	0.2284
420	0.0399	0.0526	0.0271	0.0186	0.0534	0.2033
440	0.0320	0.0483	0.0267	0.0215	0.0458	0.1813
460	0.0294	0.0273	0.0230	0.0186	0.0327	0.1335
480	0.0206	0.0136	0.0213	0.0172	0.0195	0.0923
500	0.0191	0.0126	0.0153	0.0105	0.0181	0.0757

As indicated, the worst-case calculated RF level at street-level is 0.3120 percent of the FCC MPE limit. A graph of the overall calculation results, provided on the next page, may provide a clearer *visual* illustration of the relative insignificance of the calculated RF levels. As might be expected with such low calculated RF

levels, the line representing the overall results does not noticeably rise above the graph's zero baseline, and shows a clear, consistent margin to the FCC limit.



Compliance Conclusion

The FCC MPE limit has been constructed in such a manner that continuous human exposure to RF fields up to and including 100 percent of the MPE limit is acceptable and safe.

The conservative calculations in this case show that the maximum RF level at street level from the proposed antenna operation at the site is 0.3120 percent (that is, less than 4/10^{ths} of one percent) of the FCC MPE limit. In other words, the worst-case calculated RF level is more than 320 times below the limit established as safe for continuous human exposure to the RF emissions from antennas.

The results of the calculations provide a clear demonstration of compliance. Moreover, because of the extremely conservative assumptions and calculation methodology, RF levels actually caused by the antennas will be even less significant than the calculation results here indicate.

Certification

It is the policy of Pinnacle Telecom Group that all FCC RF compliance assessments are reviewed, approved, and signed by the firm's Chief Technical Officer, who certifies as follows:

1. I have read and fully understand the FCC regulations concerning RF safety and the control of human exposure to RF fields (47 CFR 1.1301 *et seq*).
2. To the best of my knowledge, the statements and information disclosed in this report are true, complete and accurate.
3. The analysis of site RF compliance provided herein is consistent with the applicable FCC regulations, additional guidelines issued by the FCC, and industry practice.
4. The results of the analysis indicate that the subject antenna operations will be in compliance with the FCC regulations and lim it concerning RF exposure.

Daniel J. Collins

Chief Technical Officer
Pinnacle Telecom Group, LLC

8/4/09
Date

Appendix A: Background on the FCC MPE Limit

FCC Rules and Regulations

As directed by the Telecommunications Act of 1996, the FCC has established limits for maximum continuous human exposure to RF fields.

The FCC maximum permissible exposure (MPE) limits represent the consensus of federal agencies and independent experts responsible for RF safety matters. Those agencies include the National Council on Radiation Protection and Measurements (NCRP), the Occupational Safety and Health Administration (OSHA), the National Institute for Occupational Safety and Health (NIOSH), the American National Standards Institute (ANSI), the Environmental Protection Agency (EPA), and the Food and Drug Administration (FDA). In formulating its guidelines, the FCC also considered input from the public and technical community – notably the Institute of Electrical and Electronics Engineers (IEEE).

The FCC's RF exposure guidelines are incorporated in Secti on 1.301 *et seq* of its Rules and Regulations (47 CFR 1.1301-1.1310). Those guidelines specify MPE limits for both occupational and general population exposure.

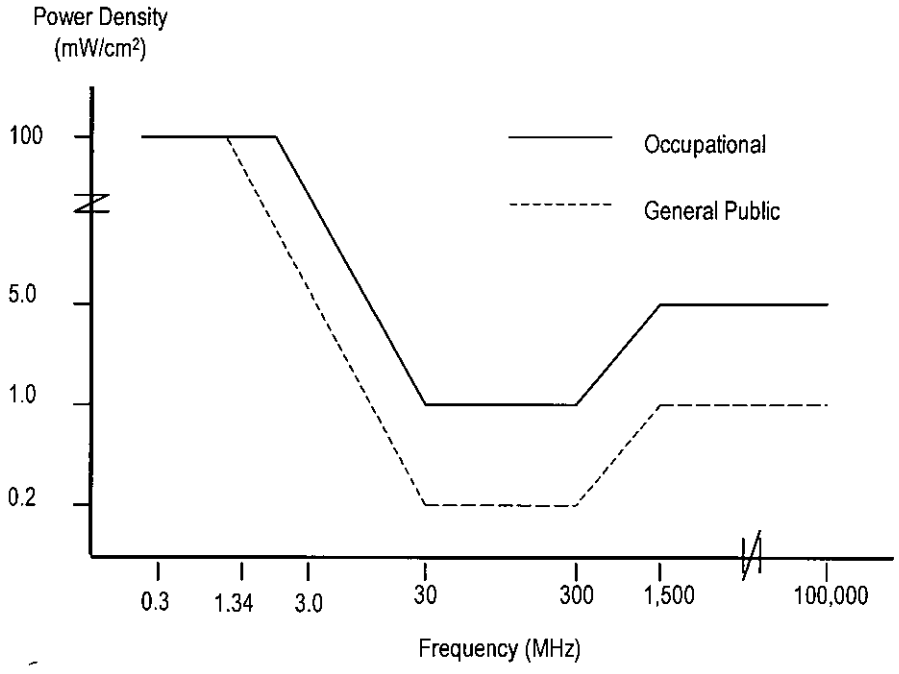
The specified continuous exposure MPE limits are based on known variation of human body susceptibility in different frequency ranges, and a Specific Absorption Rate (SAR) of 4 watts per kilogram, which is universally considered to accurately represent human capacity to dissipate incident RF energy (in the form of heat). The occupational MPE guidelines incorporate a safety factor of 10 or greater with respect to RF levels known to represent a health hazard, and an additional safety factor of five is applied to the MPE limits for general population exposure. Thus, the general population MPE limit has a built-in safety factor of more than 50. The limits were constructed to appropriately protect humans of both sexes and all ages and sizes and under all conditions – and continuous exposure at levels equal to or below the applicable MPE limits is considered to result in no adverse health effects or even health risk.

The reason for *two* tiers of MPE limits is based on an understanding and assumption that members of the general public are unlikely to have had appropriate RF safety training and may not be aware of the exposures they receive; occupational exposure in controlled environments, on the other hand, is assumed to involve individuals who have had such training, are aware of the exposures, and know how to maintain a safe personal work environment.

The FCC's RF exposure limits are expressed in two equivalent forms, using alternative units of field strength (expressed in volts per meter, or V/m), and power density (expressed in milliwatts per square centimeter, or mW/cm^2). The table on the next page lists the FCC limits for both occupational and general population exposures, using the mW/cm^2 reference, for the different radio frequency ranges.

Frequency Range (F) (MHz)	Occupational Exposure (mW/cm^2)	General Public Exposure (mW/cm^2)
0.3 - 1.34	100	100
1.34 - 3.0	100	180 / F^2
3.0 - 30	900 / F^2	180 / F^2
30 - 300	1.0	0.2
300 - 1,500	F / 300	F / 1500
1,500 - 100,000	5.0	1.0

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



Because the FCC's RF exposure limits are frequency-shaped, the exact MPE limits applicable to the instant situation depend on the frequency range used by the systems of interest.

The most appropriate method of determining RF compliance is to calculate the RF power density attributable to a particular system and compare that to the MPE limit applicable to the operating frequency in question. The result is usually expressed as a percentage of the MPE limit.

For potential exposure from multiple systems, the respective percentages of the MPE limits are added, and the total percentage compared to 100 (percent of the limit). If the result is less than 100, the total exposure is in compliance; if it is more than 100, exposure mitigation measures are necessary to achieve compliance.

FCC References

47 CFR, FCC Rules and Regulations, Part 1 (Practice and Procedure), Section 1.1310 (Radiofrequency radiation exposure limits).

47 CFR, FCC Rules and Regulations, P art 22 (Public Mobile Services).

47 CFR, FCC Rules and Regulations, Part 24 (Personal Communications Services).

FCC Second Memorandum Opinion and Order and Notice of Proposed Rulemaking (FCC 97-303), *In the Matter of Procedures for Reviewing Requests for Relief From State and Local Regulations Pursuant to Section 332(c)(7)(B)(v) of the Communications Act of 1934 (WT Docket 97-192), Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation (ET Docket 93-62), and Petition for Rulemaking of the Cellular Telecommunications Industry Association Concerning Amendment of the Commission's Rules to Preempt State and Local Regulation of Commercial Mobile Radio Service Transmitting Facilities*, released August 25, 1997.

FCC First Memorandum Opinion and Order, ET Docket 93-62, *In the Matter of Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation*, released Decem ber 24, 1996.

FCC Report and Order, ET Docket 93-62, *In the Matter of Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation*, released August 1, 1996.

FCC Office of Engineering and Technology (OET) Bulletin 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", Edition 97-01, August 1997.

FCC Office of Engineering and Technology (OET) Bulletin 56, "Questions and Answers About Biological Effects and Potential Hazards of RF Radiation", edition 4, August 1999.

Appendix B: Summary of Expert Qualifications

Daniel J. Collins, Chief Technical Officer, Pinnacle Telecom Group, LLC

Synopsis:	• 36 years of experience in all aspects of wireless system engineering, related regulation, and RF exposure • Has performed or led RF exposure compliance assessments on more than 12,000 antenna sites since the new FCC rules went into effect in 1997 • Has provided testimony as an RF compliance expert more than 1,200 times since 1997 • Accepted as an expert in Connecticut, New Jersey, New York, Pennsylvania and more than 40 other states, as well as by the FCC
Education:	• B.E.E., City College of New York (Sch. Of Eng.), 1971 • M.B.A., 1982, Fairleigh Dickinson University, 1982 • Bronx High School of Science, 1966
Current Responsibilities:	• Leads all PTG staff work involving RF safety and FCC compliance, microwave and satellite system engineering, and consulting on wireless technology and regulation
Prior Experience:	• Edwards & Kelcey, VP – RF Engineering and Chief Information Technology Officer, 1996-99 • Bellcore, Executive Director – Regulation and Public Policy, 1983-96 • AT&T (Corp. HQ), Director – Spectrum Management Policy and Practice, 1977-83 • AT&T Long Lines, Group Supervisor – Microwave Radio System Design, 1972-77
Specific RF Safety / Compliance Experience:	• Involved in RF exposure matters since 1972 • Have had lead corporate responsibility for RF safety and compliance at AT&T, Bellcore, Edwards & Kelcey, and PTG • While at AT&T, helped develop the mathematical models later adopted by the FCC for predicting RF exposure • Have been relied on for compliance by all major wireless carriers, as well as by the federal government, several state and local governments, equipment manufacturers, system integrators, and other consulting / engineering firms
Other Background:	• Author, *Microwave System Engineering* (AT&T, 1974) • Co-author and executive editor, *A Guide to New Technologies and Services* (Bellcore, 1993) • National Spectrum Managers Association (NSMA) – former three-term President and Chairman of the Board of Directors; was founding member, twice-elected Vice President, a long-time member of the Board of Directors, and was named an NSMA Fellow in 1991 • Listed in *Who's Who in the Media and Communication* and *International Who's Who in Information Technology* • Published more than 35 articles in industry magazines

Structural Analysis for
SBA Network Services, Inc.

155' Monopole

Site Name: North Bethel
Site ID: CT00248-S

FDH Project Number 09-06102E S1 (R1)

Prepared By:

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Project Engineer

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July 22, 2009

Prepared pursuant to ANSI/TIA-222-G Structural Standards for Antenna Supporting Structures and Antennas

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EXECUTIVE SUMMARY

At the request of SBA Network Services, Inc., FDH Engineering, Inc. performed a structural analysis of the monopole located in Bethel, CT to determine whether the tower is structurally adequate to support both the existing and proposed loads, pursuant to the *Structural Standards for Antenna Supporting Structures and Antennas, ANSI/TIA-222-G.* Information pertaining to the existing/proposed antenna loading, current tower geometry, and member sizes was obtained from Summit Manufacturing, LLC (Job No. 4071) original design drawings dated October 22, 1998 and SBA Network Services.

The *basic design wind speed* per *ANSI/TIA-222-G* standards is 110 MPH without ice and 50 MPH with ¾" of ice. Ice is considered to increase in thickness with height.

Conclusions

With the existing and proposed antennas from Metro PCS at 117 ft, the tower meets the requirements of the *ANSI/TIA-222-G* standards. Furthermore, provided the foundation was designed and constructed to support the original design reactions (see Summit Job No. 4071), the foundation should have the necessary capacity to support the existing and proposed loading. For a more detailed description of the analysis of the tower, see the **Results** section of this report.

Our structural analysis has been performed assuming all information provided to FDH Engineering, Inc. is accurate (i.e., the steel data, tower layout, existing and proposed antenna loading) and that the tower has been properly erected and maintained per the original design drawings.

Recommendations

To ensure the requirements of the *ANSI/TIA-222-G* standards are met with the existing and proposed loading in place, we have the following recommendations:

1. The proposed coax lines should be installed double stacked outside the monopole shaft.

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APPURTENANCE LISTING

The proposed and existing antennas with their corresponding cables/coax lines are shown in **Table 1.** *If the actual layout determined in the field deviates from this layout, FDH Engineering, Inc. should be contacted to perform a revised analysis.*

Table 1 – Appurtenance Loading

Existing Loading:

No.	Centerline Elevation (ft)	Coax and Lines[1]	Carrier	Mount Type	Description
1-11	157	(12) 1-5/8" (2) 1/2"	Sprint	13' Low Profile Platform (assumed)	(2) Decibel DB980H65T2E-M (2) Decibel DB980H90E-M (2) Decibel DB980H65E-M (3) KMW-AM-X-WM-17-65-00T (2) Andrew VHLP2-23-2WH Dishes
12-20	147	(9) 1-1/4"	Nextel	13' Low Profile Platform (assumed)	(9) Decibel DB844H90E-XY
21-32	137	(12) 1-5/8" (1) 1/2"	Verizon	13' Low Profile Platform (assumed)	(2) Antel LPA-80080/6CF (2) Antel LPA-80090/4CF (2) Antel LPA-80063/6CF (6) Antel LPA-185090/8CF (1) GPS
33-35	127	(9) 1-1/4"	AT&T	(3) 4' Standoffs (assumed)	(3) Powerwave 7770.00 (6) Powerwave LGP21401 TMAs

1 The existing coax is located inside the pole's shaft, unless otherwise noted.
2 The coax for Sprint to 157 ft is located outside the monopole shaft in a single row.

Proposed Loading:

No.	Centerline Elevation (ft)	Coax and Lines	Carrier	Mount Type	Description
1-6	117	(12) 1-5/8" (1) 1/2"	Metro PCS	(3) T-Arms	(3) Kathrein 800-10504 (3) Kathrein 742-351 (6) RETs

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RESULTS

Based on information obtained from the original design drawings, the yield strength of steel for individual members was as follows:

Table 2 - Material Strength

Member Type	Yield Strength
Tower Shaft Sections	65 ksi
Base Plate	50 ksi
Anchor Bolts	75 ksi

Table 3 displays the ratio (as a percentage) of force in the member to their capacities. Values greater than 100% indicate locations where the maximum force in the member exceeds its capacity. **Table 4** displays the maximum foundation reactions.

If the assumptions outlined in this report differ from actual field conditions, FDH Engineering, Inc. should be contacted to perform a revised analysis. Furthermore, as no information pertaining to the allowable twist and sway requirements for the existing or proposed appurtenances was provided, deflection and rotation were not taken into consideration when performing this analysis.

See the **Pole Profile** and **Base Level Sketch** for detailed modeling information.

Table 3 – Summary of Working Percentage of Structural Components

Section No.	Elevation ft	Component Type	Size	% Capacity	Pass Fail
L1	155 - 120	Pole	TP26x16.5x0.1875	75.3	Pass
L2	120 - 89.5	Pole	TP33.91x24.7429x0.3125	79.0	Pass
L3	89.5 - 44	Pole	TP45.64x32.1306x0.375	86.0	Pass
L4	44 - 0	Pole	TP56.83x43.3286x0.375	94.5	Pass
		Anchor Bolts	(20) 2.25" ø on a 64" BC	63.9	Pass
		Base Plate	2.75" thick x 64" square	68.0	Pass

Table 4 – Maximum Base Reactions

Load Type	Current Analysis *(ANSI/TIA-222-G)**	Original Design *(TIA/EIA-222-F)*
Axial	44 k	39 k
Shear	43 k	32 k
Moment	4,254 k-ft	3,850 k-ft

* Current analysis reactions are within an allowable factor of 1.35 when the original design reactions are based on an allowable stress design per *ANSI/TIA-222-G*.

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GENERAL COMMENTS

This engineering analysis is based upon the theoretical capacity of the structure. It is not a condition assessment of the tower and its foundation. It is the responsibility of SBA Network Services, Inc. to verify that the tower modeled and analyzed is the correct structure (with accurate antenna loading information) modeled. If there are substantial modifications to be made or the assumptions made in this analysis are not accurate, FDH Engineering, Inc. should be notified immediately to perform a revised analysis.

LIMITATIONS

All opinions and conclusions are considered accurate to a reasonable degree of engineering certainty based upon the evidence available at the time of this report. All opinions and conclusions are subject to revision based upon receipt of new or additional/updated information. All services are provided exercising a level of care and diligence equivalent to the standard and care of our profession. No other warranty or guarantee, expressed or implied, is offered. Our services are confidential in nature and we will not release this report to any other party without the client's consent. The use of this engineering work is limited to the express purpose for which it was commissioned and it may not be reused, copied, or distributed for any other purpose without the written consent of FDH Engineering, Inc.

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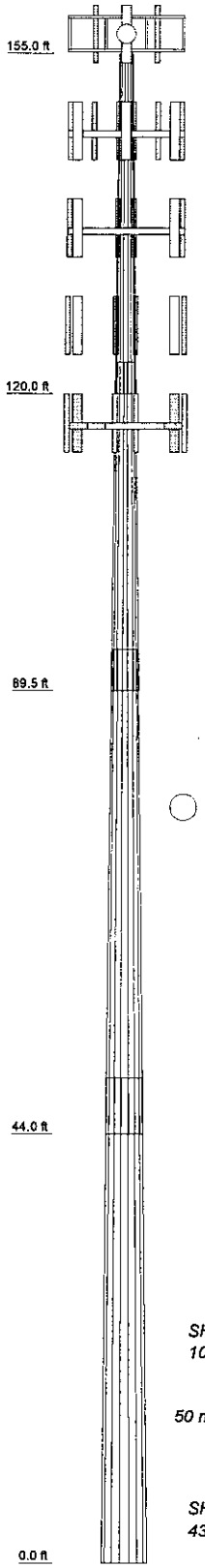
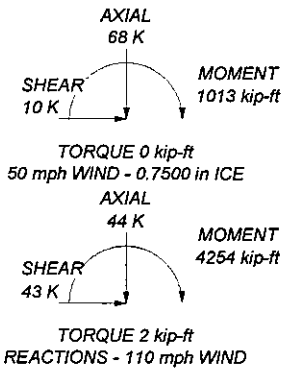
Section	1	2	3	4
Length (ft)	35.00	33.75	49.75	49.75
Number of Sides	18	18	18	18
Thickness (in)	0.1875	0.3125	0.3750	0.3750
Lap Splice (ft)	3.25	4.25	5.75	
Top Dia (in)	16.5000	24.7420	32.1306	43.3286
Bot Dia (in)	26.0000	33.9100	45.6400	56.8300
Grade	A607-65			
Weight (K)	1.5	3.3	7.8	10.0





TORQUE 0 kip-ft
50 mph WIND - 0.7500 in ICE

TORQUE 2 kip-ft
REACTIONS - 110 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
DB980H65T2E-M w/Mount Pipe (Sprint)	157	(2) LPA-185090/8 w/Mount Pipe (Verizon)	137
DB980H65T2E-M w/Mount Pipe (Sprint)	157	4' Side Mount Standoff (1) (ATT)	127
DB980H90E-M w/Mount Pipe (Sprint)	157	4' Side Mount Standoff (1) (ATT)	127
DB980H90E-M w/Mount Pipe (Sprint)	157	4' Side Mount Standoff (1) (ATT)	127
DB980H65E-M w/Mount Pipe (Sprint)	157	Powerwave 7770 w/ Mount Pipe (ATT)	127
DB980H65E-M w/Mount Pipe (Sprint)	157	Powerwave 7770 w/ Mount Pipe (ATT)	127
KMW AM-X-WM-17-65-00T (Sprint)	157	Powerwave 7770 w/ Mount Pipe (ATT)	127
KMW AM-X-WM-17-65-00T (Sprint)	157	(2) TMA - Powerwave LGP21401 (ATT)	127
KMW AM-X-WM-17-65-00T (Sprint)	157	(2) TMA - Powerwave LGP21401 (ATT)	127
13' Low Profile Platform (Sprint)	157	(2) TMA - Powerwave LGP21401 (ATT)	127
Andrew VHLP2-23-2WH (Sprint)	157	Kathrein 742-351 w/ Mount Pipe (Metro PCS)	117
Andrew VHLP2-23-2WH (Sprint)	157	Kathrein 742-351 w/ Mount Pipe (Metro PCS)	117
(3) DB844H90E-XY w/Mount Pipe (Nextel)	147	Kathrein 742-351 w/ Mount Pipe (Metro PCS)	117
13' Low Profile Platform (Nextel)	147	(2) RET (Metro PCS)	117
(3) DB844H90E-XY w/Mount Pipe (Nextel)	147	(2) RET (Metro PCS)	117
(3) DB844H90E-XY w/Mount Pipe (Nextel)	147	(2) RET (Metro PCS)	117
(2) LPA-185090/8 w/Mount Pipe (Verizon)	137	T-Arm (Metro PCS)	117
13' Low Profile Platform (Verizon)	137	T-Arm (Metro PCS)	117
(2) Antel LPA-80080/6cf w/ Mount Pipe	137	T-Arm (Metro PCS)	117
(2) LPA-80090/4CF w/Mount Pipe	137	Kathrein 800-10504 w/ Mount Pipe (Metro PCS)	117
(2) Antel LPA-80063/6CF w/ Mount Pipe	137	Kathrein 800-10504 w/ Mount Pipe (Metro PCS)	117
GPS (Verizon)	137		
(2) LPA-185090/8 w/Mount Pipe (Verizon)	137	Kathrein 800-10504 w/ Mount Pipe (Metro PCS)	117

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 110 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. TOWER RATING: 94.5%

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Job: *North Bethel CT00248-S*		
Project: *09-06102E S1 (R1)*		
Client: SBA	Drawn by: Krystyn Wagner	App'd:
Code: TIA-222-G	Date: 07/22/09	Scale: NTS
Path:		Dwg No. E-1