



# **PINNACLE TELECOM GROUP**

*Consulting and Engineering Services*

## **ANTENNA SITE FCC COMPLIANCE ASSESSMENT AND REPORT**

**SPRINT**

**SITE DC03XC179**

**"LEE PUMPING STATION WATER TANKS"**

**2400 WAKEFIELD COURT**

**ARLINGTON, VA**

April 16, 2007

## **CONTENTS**

<b>INTRODUCTION AND SUMMARY</b>	<b>3</b>
<b>SITE DESCRIPTION</b>	<b>4</b>
<b>MEASUREMENT RESULTS</b>	<b>4</b>
<b>COMPLIANCE ANALYSIS AND CONCLUSION</b>	<b>6</b>
<b>CERTIFICATION</b>	<b>7</b>

**APPENDIX A. SITE MAP AND PHOTOGRAPHS**

**APPENDIX B. MEASUREMENT EQUIPMENT AND PROCEDURE**

**APPENDIX C. BACKGROUND ON THE FCC RF EXPOSURE LIMITS**

**APPENDIX D. FCC REFERENCES**

**APPENDIX E. EXPERT QUALIFICATIONS**

## INTRODUCTION AND SUMMARY

On April 13, 2007, at the request of Sprint, Pinnacle Telecom Group performed on-site RF measurements to assess FCC compliance for a Sprint wireless base station antenna operation on a water tank located at 2400 Wakefield Court in Arlington, VA. Sprint refers to the antenna site by the code "DC03XC179".

Sprint is licensed by the Federal Communications Commission (FCC) to provide commercial two-way wireless communications, and operates directional panel antennas mounted on the subject water tank. The tank also supports several omnidirectional (whip) and exposed dipole antennas, and two microwave dish antennas. This compliance assessment addresses the RF exposure levels resulting from the combination of all transmitting antennas at the site, as well as from all other transmitting antennas in the nearby vicinity.

The results of the on-site measurements at ground level around the water tank show the maximum RF exposure level is 1.5 percent of the FCC general population MPE limit. In other words, the maximum measured RF level at the site is more than 65 times below the level the FCC considers safe for continuous exposure of the general population.

The remainder of this report provides information on the site, the measurement results, an analysis of those results with respect to RF compliance, and a certification of site compliance. In addition, several appendices are included. Appendix A provides a site map and photographs taken the day of the measurements. Appendix B provides a description of the measurement equipment and procedures. Appendix C provides background on the FCC limits for RF exposure. Appendix D provides a list of key FCC references on RF exposure and site compliance. Finally, Appendix E provides a summary of the expert certifying compliance for this site.

## **SITE DESCRIPTION**

The site is a water tank populated with panel antennas operated by Sprint, in addition to several whip and exposed dipole antennas and two microwave dish antennas (For clarity, please see the photographs of the site, provided in Appendix A).

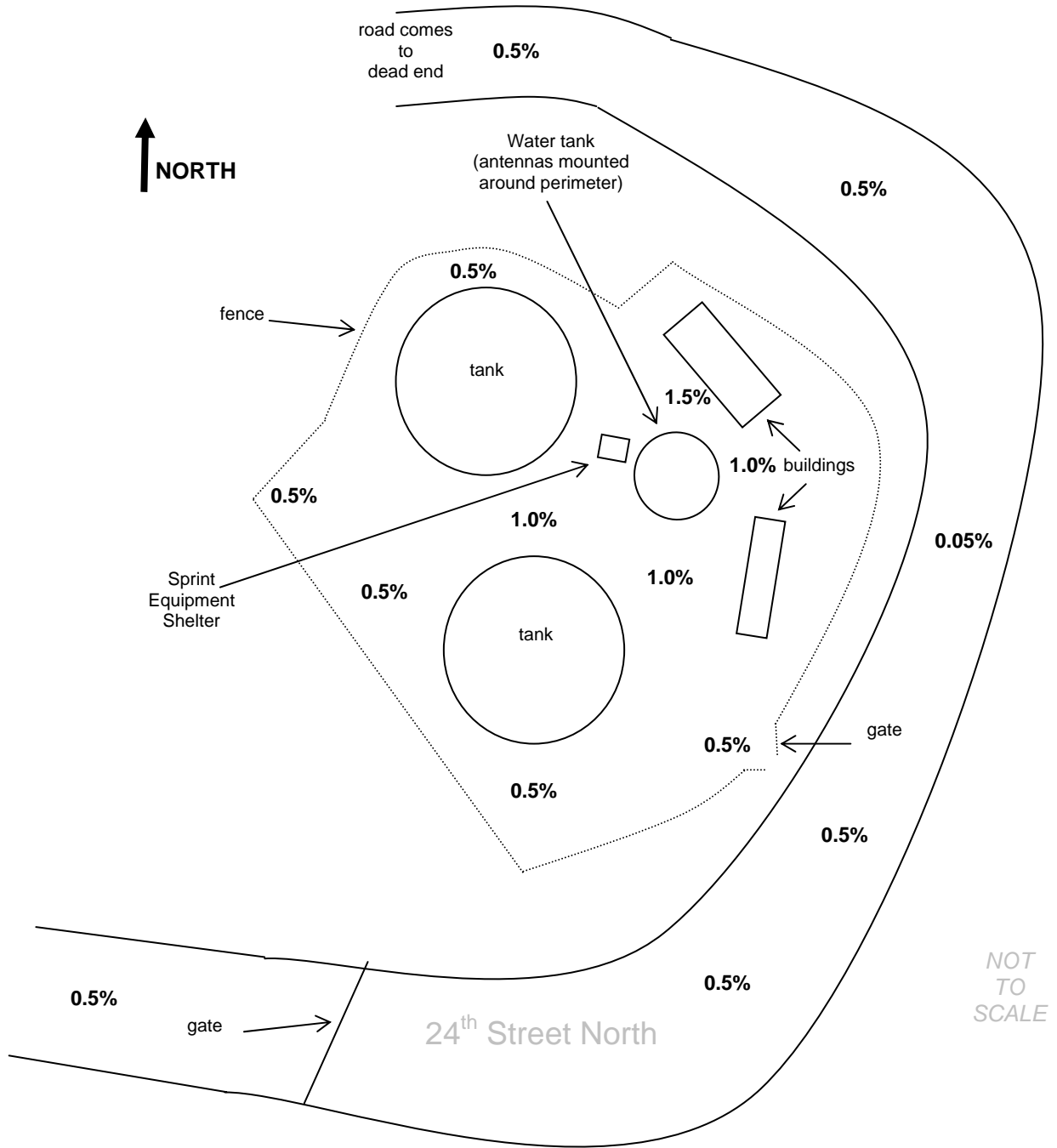
The water tank site is surrounded by a chain link fence, and access inside the compound is restricted to authorized personnel. There are private residences in the immediate vicinity surrounding the site. While the access restriction would allow us to apply the FCC's "occupational" MPE limit (see Appendix C) to the area inside the fence, we will conservatively apply the stricter FCC "general population" MPE limit to the analysis of RF levels both inside and outside the fence.

## **MEASUREMENT RESULTS**

The results of the ground-level measurements, expressed as a percentage of the FCC general population MPE limit, are overlaid on the plan view sketch on the next page.

Note that the measurement equipment is designed to read out a percentage of the "controlled" or "occupational" MPE limit, and the results are multiplied by five to reference the "uncontrolled" or "general population" limit.

Sufficient time was spent performing the measurements to assure – as FCC guidance suggests – a "real-world" depiction of the RF levels in the area.



**Note: Measurements were also taken outside the compound, in the surrounding neighborhood along 24<sup>th</sup> Street North, Wakefield Court, North Wakefield Street, 25<sup>th</sup> Street North and North Vernon Street. In all these areas, the measured RF level did not exceed 0.5% of the FCC general population MPE limit.**

## **Compliance Analysis and Conclusion**

The results of the measurements around the site show that the RF levels in all areas at ground level around the subject site are insignificantly low. The maximum RF reading around the site was 1.5 percent of the FCC general population MPE limit.

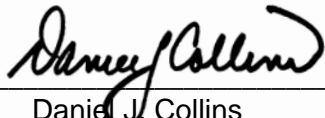
In other words, the highest measured RF level around the site was still more than 65 times below the limit considered by the federal government to be completely acceptable for continuous human exposure.

Therefore, the antenna site is in compliance with the strictest FCC limit for the control of human exposure to RF fields.

## CERTIFICATION

The undersigned hereby 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. The equipment used to perform the RF measurements described herein is appropriate to the task, and calibration of its accuracy has been performed within the past 12 months as recommended by the manufacturer.
3. The on-site RF measurements described herein were performed in a manner consistent with industry standards.
4. To the best of my knowledge, the statements and information disclosed in this report are true, complete and accurate.
5. The analysis of site RF compliance provided herein is consistent with the applicable FCC regulations, additional guidelines issued by the FCC, and industry practice.
6. The results of the analysis indicate that the subject site is in full compliance with the FCC regulations concerning RF exposure.



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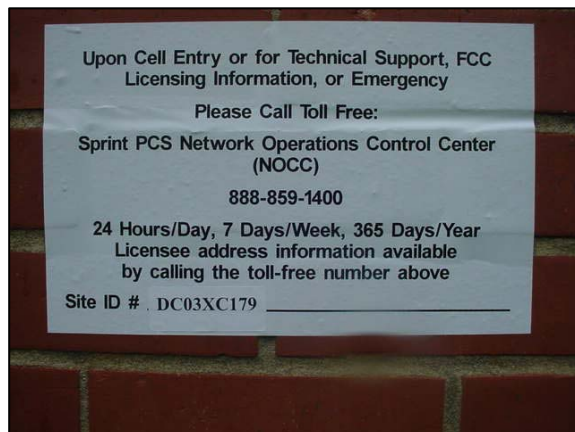
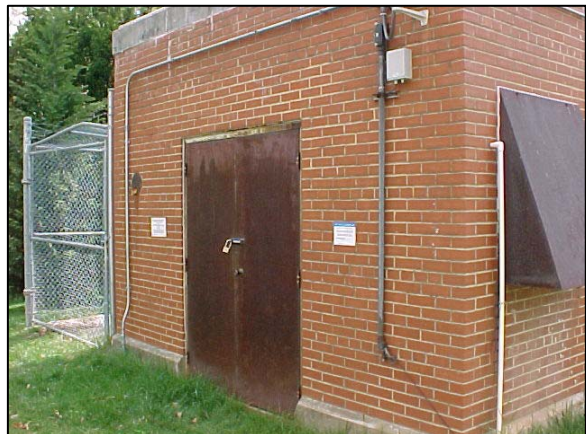
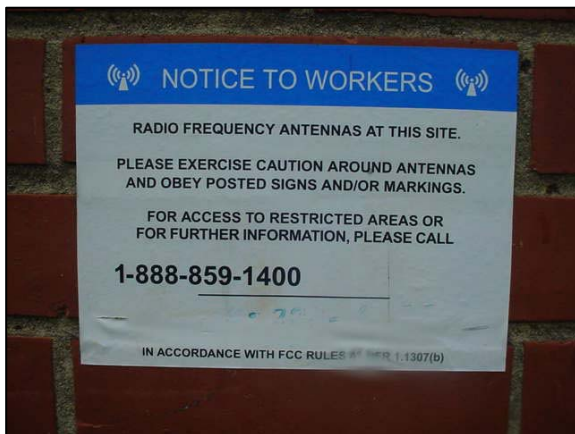
Daniel J. Collins  
Chief Technical Officer  
Pinnacle Telecom Group, LLC

4/16/07

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Date





## **Appendix B: MEASUREMENT EQUIPMENT AND PROCEDURE**

The RF exposure measurements were performed using a Narda model 8722 RF probe and Narda model 8715 RF meter. Both the probe and meter are capable of broadband RF measurements, covering a range of 300 kHz to 50 GHz. The measuring equipment is designed to automatically register all RF levels from all sources within that frequency range, and report them as percentages of the FCC's overall occupational MPE limit. To convert those results to reference the FCC general population limit, they are simply multiplied by five. (See Appendix C.)

The equipment is calibrated once every year, as per the manufacturer's recommendations, and was last calibrated by the manufacturer in September 2006.

The measurements were taken in a manner consistent with training provided by the equipment manufacturer, including the "RF Field Measurements for Antenna Sites" videotape, developed by Richard Tell Associates and now included as part of the Narda equipment package.

In order to ensure "safe-side" results, maximum RF spot-levels were measured and reported in all areas. No spatial-averaging was employed, and in accordance with guidance provided by the FCC Office of Engineering and Technology staff, sufficient time was spent performing the measurements to ensure a "real-world" depiction of the maximum RF effect caused by the antennas.

## Appendix C: Background on the FCC RF Exposure Limits

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 Section 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.

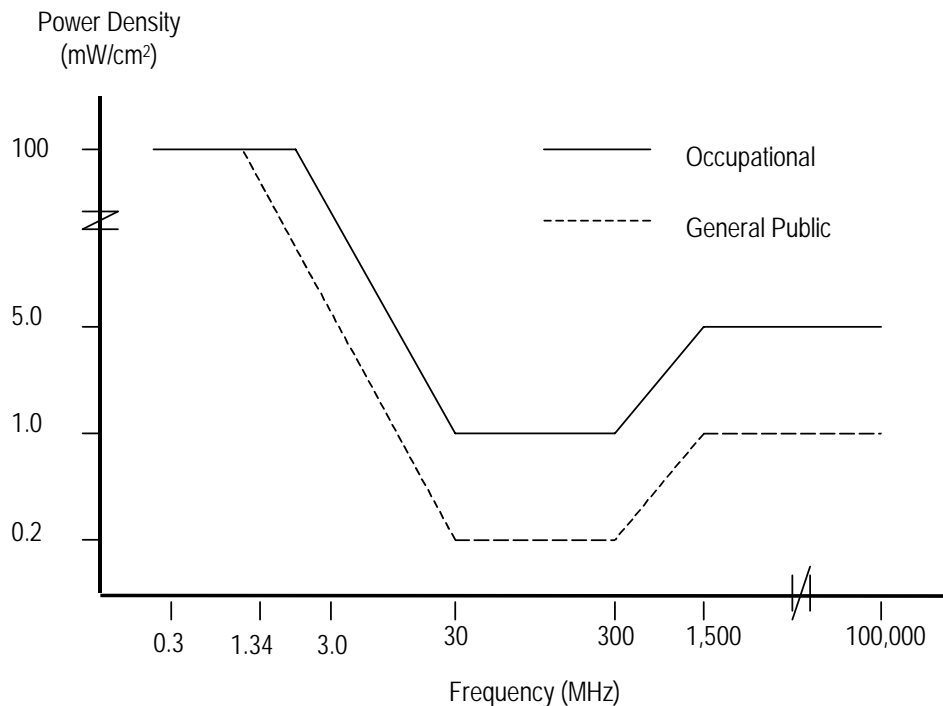
The specified continuous exposure MPE limits are based on known variation of human body susceptibility in different frequency ranges, and a Specific Absorption Rate (SAR) of 4 watts per kilogram, which is universally considered to accurately represent human capacity to dissipate incident RF energy (in 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. Continuous exposure at levels equal to or below the applicable MPE limits is considered to result in no adverse health effects on humans.

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<sup>2</sup>). The table on the next page lists the FCC limits for both occupational and general population exposures, using the mW/cm<sup>2</sup> reference, for the different radio frequency ranges.

Frequency Range (F) (MHz)	Occupational Exposure (mW/cm <sup>2</sup> )	General Public Exposure (mW/cm <sup>2</sup> )
0.3 - 1.34	100	100
1.34 - 3.0	100	180 / F <sup>2</sup>
3.0 - 30	900 / F <sup>2</sup>	180 / F <sup>2</sup>
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 limit applicable to any source depends on the frequency range transmitted.

Note that with multiple RF sources, the overall exposure effect at any point is a function of the sum of the respective "percentage-of-the-MPE-limit" contributions.

## Appendix D: 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, Part 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 December 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.

"RF Field Measurements for Antenna Sites", (video), Richard Tell Associates Inc., 1997.

"EME Awareness for Antenna Site Safety", (video), Motorola (produced in association with Richard Tell Associates Inc.), 1997.

## APPENDIX E: EXPERT QUALIFICATIONS

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

<p><b>Synopsis:</b></p>	<ul style="list-style-type: none"> <li>• 35 years of experience in all aspects of wireless system engineering, related regulation, and RF exposure</li> <li>• Has performed or led RF exposure compliance assessments on more than 10,000 antenna sites since the new FCC regulations went into effect in 1997</li> <li>• Has provided testimony as an RF compliance expert more than 1,000 times since 1997</li> <li>• Have been accepted as an expert in New Jersey and more than 40 other states, as well as by the FCC</li> </ul>
<p><b>Education:</b></p>	<ul style="list-style-type: none"> <li>• B.E.E., City College of New York (Sch. Of Eng.), 1971</li> <li>• M.B.A., 1982, Fairleigh Dickinson University, 1982</li> <li>• Bronx High School of Science, 1966</li> </ul>
<p><b>Current Responsibilities:</b></p>	<ul style="list-style-type: none"> <li>• lead all PTG staff work involving RF safety and FCC compliance, microwave and satellite system engineering, and consulting on wireless technology and regulation</li> </ul>
<p><b>Prior Experience:</b></p>	<ul style="list-style-type: none"> <li>• Edwards &amp; Kelcey, VP – RF Engineering and Chief Information Technology Officer, 1996-99</li> <li>• Bellcore, Executive Director – Regulation and Public Policy, 1983-96</li> <li>• AT&amp;T (Corp. HQ), Director – Spectrum Management Policy and Practice, 1977-83</li> <li>• AT&amp;T Long Lines, Group Supervisor – Microwave Radio System Design, 1972-77</li> </ul>
<p><b>Specific RF Safety / Compliance Experience:</b></p>	<ul style="list-style-type: none"> <li>• Involved in RF exposure matters since 1972</li> <li>• Have had lead corporate responsibility for RF safety and compliance at AT&amp;T, Bellcore, Edwards &amp; Kelcey, and PTG</li> <li>• While at AT&amp;T, helped develop the mathematical models later adopted by the FCC for predicting RF exposure</li> <li>• 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</li> </ul>
<p><b>Other Background:</b></p>	<ul style="list-style-type: none"> <li>• Author, <i>Microwave System Engineering</i> (AT&amp;T, 1974)</li> <li>• Co-author and executive editor, <i>A Guide to New Technologies and Services</i> (Bellcore, 1993)</li> <li>• National Spectrum Managers Association (NSMA) – served three terms President and Chair of the Board of Directors; was founding member, twice-elected Vice President, long-time member of the Board, and was named an NSMA Fellow in 1991</li> <li>• Listed in <i>Who's Who in the Media and Communication</i> and <i>International Who's Who in Information Technology</i></li> <li>• Published more than 35 articles in industry magazines</li> </ul>