STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square
New Britain, Connecticut 06051
Phone: (860) 827-2935
Fax: (860) 827-2950

May 25, 2000

Christopher B. Fisher
Cuddy & Feder & Worby LLP
90 Maple Avenue
White Plains, NY 10601-5196

RE: TS-AT&T-148-991213 - AT&T Wireless PCS request for an order to approve tower sharing at an existing telecommunications tower located at 90 North Plains Industrial Road in Wallingford, Connecticut.

Dear Mr. Fisher:

At a public meeting held May 24, 2000, the Connecticut Siting Council (Council) approved the relocation of the AT&T equipment shelter as specified in your letter dated April 28, 2000.

Thank you for your attention and cooperation.

Very truly yours,

Mortimer A. Gelston
Chairman

MAG/RKE/grg

c: Honorable William W. Dickinson, Jr., Mayor, Town of Wallingford
Linda Bush, Town Planner, Town of Wallingford
Jennifer Gaudet, Pinnacle Development

CUDDY & FEDER & WORBY LLP

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ROBERT L. OSAR (also TX)
MARYANN M. PALERMO
ROBERT C. SCHNEIDER
LOUIS R. TAFFERA

April 28, 2000

VIA FEDERAL EXPRESS
Mr. Joel Rinebold
Connecticut Siting Council
10 Franklin Square
New Britain, Connecticut 06051

Re: AT&T Wireless Services Shared Use of an Existing Tower
at 90 North Plains Industrial Road, Wallingford, Connecticut

Dear Mr. Rinebold:

On behalf of AT&T Wireless PCS, LLC d/b/a AT&T Wireless Services, enclosed please find a revised Compound Plan for the above referenced site. As you know, AT&T received approval for the Shared Use of this existing tower from the Council on December 20, 1999. SpectraSite, the owner of the tower, requested that the location of AT&T's equipment shelter be relocated within the fenced compound to better provide for future co-location opportunities. Given the foregoing, we trust that this minor revision can be simply noted as an as-built condition consistent with the Council's approval.

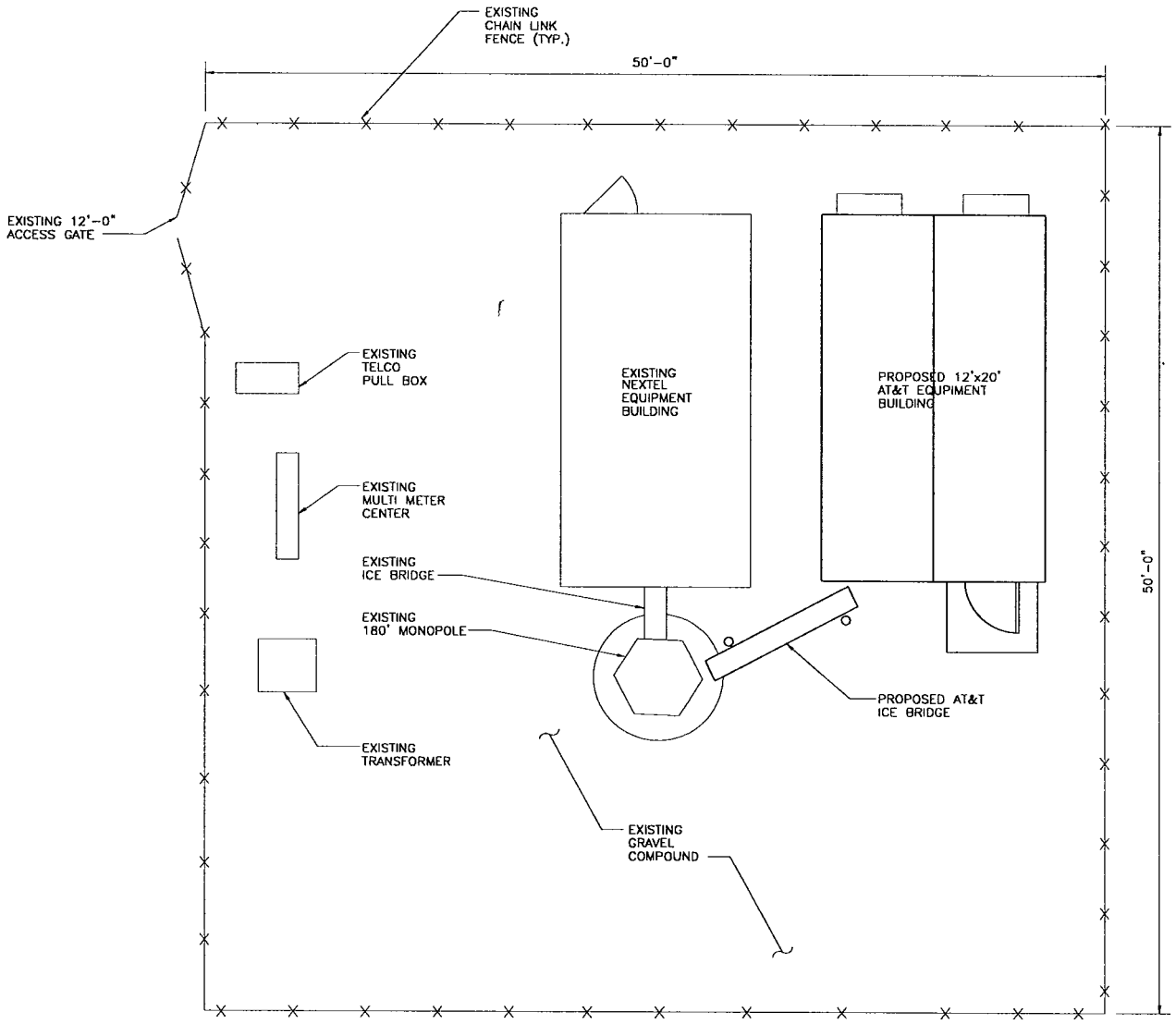
Please do not hesitate to contact me should you have any questions or concerns.

Very Truly Yours,

Christopher B. Fisher

Encl.
cc: Jennifer Gaudet
Michael Murphy

C&F&W: 259331. 01



1 / SC-1 **COMPOUND PLAN**

SCALE: 1"=10'

0 5 10 20

SITE ID NO: CT-173	URS Greiner Woodward Clyde A-E-S 500 ENTERPRISE DRIVE ROCKY HILL, CONNECTICUT 1-(860)-529-8882	AT&T WIRELESS PCS LLC UNMANNED WIRELESS COMMUNICATION EQUIPMENT SITE
Designed by:		SITE ADDRESS: YALESVILLE 90 NORTH PLAINS INDUSTRIAL ROAD WALLINGFORD, CT
Drawn by: JMP		
Checked by:		

REV.	DATE:	DESCRIPTION
1	4/26/00	REVISIONS

Scale: AS SHOWN | Date: 12-06-99 | Job No. F301824.81 | File No. SC-1

Dwg. No. SC-1

Dwg. 1 of 2

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square
New Britain, Connecticut 06051
Phone: (860) 827-2935
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December 23, 1999

Christopher B. Fisher
Cuddy & Feder & Worby LLP
90 Maple Avenue
White Plains, NY 10601-5196

RE: TS-AT&T-148-991213 - AT&T Wireless PCS request for an order to approve tower sharing at an existing telecommunications facility located at 90 North Plains Industrial Road in Wallingford, Connecticut.

Dear Attorney Fisher:

At a public meeting held December 20, 1999, the Connecticut Siting Council (Council) ruled that the shared use of this existing tower site is technically, legally, environmentally, and economically feasible and meets public safety concerns, and therefore, in compliance with General Statutes § 16-50aa, the Council has ordered the shared use of this facility to avoid the unnecessary proliferation of tower structures, conditioned on a requirement that dead landscaping vegetation existing at the tower site be replaced.

This facility has been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower. Any additional change to this facility will require an explicit request to this agency pursuant to § 16-50aa or notice pursuant to Regulations of Connecticut State Agencies Section 16-50j-73, as applicable. Such request or notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Any deviation from this format may result in the Council implementing enforcement proceedings pursuant to General Statutes § 16-50u including, without limitation, imposition of expenses resulting from such failure and of civil penalties in an amount not less than one thousand dollars per day for each day of construction or operation in material violation.

This decision applies only to this request for tower sharing and is not applicable to any other request or construction.

The proposed shared use is to be implemented as specified in your letter dated December 10, 1999, in additional information dated December 17, 1999, and as conditioned by the Council.

Thank you for your attention and cooperation.

Very truly yours,

Mortimer A. Gelston
Chairman

MAG/SLL/sll

c: Honorable William W. Dickinson, Jr., Mayor, Town of Wallingford
Ronald C. Clark, Manager – Real Estate Operations, Nextel Communications, Inc.

CUDDY & FEDER & WORBY LLP

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ROBERT L. OSAR (also TX)
ROBERT C. SCHNEIDER
LOUIS R. TAFFERA

December 10, 1999

VIA FEDERAL EXPRESS
Hon. Mortimer Gelston, Chairman and Members
of the Siting Council
Connecticut Siting Council
10 Franklin Square
New Britain, Connecticut 06051

Re: Request by AT&T Wireless Services for the Shared Use of an Existing Tower at 90 North Plains Industrial Road, Wallingford, Connecticut

Hon. Mortimer Gelston, Chairman and Members of the Siting Council:

Pursuant to Connecticut General Statutes (C.G.S.) § 16-50aa, AT&T Wireless PCS LLC, by and through its agent AT&T Wireless Services, Inc. ("AT&T Wireless") hereby requests an order from the Connecticut Siting Council (the "Council") to approve the proposed shared use of an existing communications tower, located at 90 North Plains Industrial Road in the Town of Wallingford, owned by SpectraSite Communications, Inc. (the "SpectraSite Facility"). The Applicant has entered into an agreement with the tower owner to permit the installation of a wireless communications facility at the existing SpectraSite Facility. See license signature page annexed hereto as Exhibit A.

The SpectraSite Facility

The SpectraSite Facility consists of a 180' monopole tower and other equipment at grade within a fenced compound. Currently on the tower are Nextel antennas. The parcel on which the SpectraSite Facility is located in an industrial park and commercial area bordered largely by Route 15 (Wilbur Cross Parkway), Route 5 and Route 68.

AT&T Wireless' Facility

As shown on the enclosed plans prepared by URS Greiner, including a site plan and elevation, AT&T Wireless proposes shared use of the facility to provide FCC licensed wireless services. AT&T Wireless will install up to twelve panel antennas on a low profile platform at approximately the 160' level of the tower and will construct a 12' x 20' equipment shelter within the fenced compound.

Connecticut General Statutes § 16-50aa provides that, upon written request for shared use approval, an order approving such use shall be issued, "if the council finds that the proposed shared use of the facility is technically, legally, environmentally and economically feasible and meets public safety concerns." (C.G.S. § 16-50aa(c)(1).) Further, upon approval of such shared use, it is exclusive and no local zoning or land use approvals are required C.G.S. § 16-50x. Shared use of the SpectraSite Facility satisfies the approval criteria set forth in C.G.S. § 16-50aa as follows:

A. Technical Feasibility SpectraSite has confirmed that the tower has been designed to support the addition of AT&T Wireless' antennas. The proposed shared use of this tower is therefore technically feasible.

B. Legal Feasibility Pursuant to C.G.S. § 16-50aa, the Council has been authorized to issue an order approving shared use of the existing SpectraSite Facility. (C.G.S. § 16-50aa(c)(1)). Under the authority vested in the Council by C.G.S. § 16-50aa, an order by the Council approving the shared use of a tower would permit the Applicant to obtain a building permit for the proposed installation.

C. Environmental Feasibility The proposed shared use would have a minimal environmental effect, for the following reasons:

1. The proposed installation would have a de minimis visual impact, and would not cause any significant change or alteration in the physical or environmental characteristics of the existing facility;

2. The proposed installation by AT&T Wireless would not increase the height of the tower itself and would not extend the boundaries of SpectraSite's lease parcel;

3. The proposed installation would not increase the noise levels at the existing facility boundaries by six decibels or more;

4. Operation of AT&T Wireless' antennas at this site would not exceed the total radio frequency electromagnetic radiation power density level adopted by the FCC and Connecticut Department of Health. The "worst case" exposure calculated for the operation of this facility for all carriers, would be approximately 0.05% of the standard. See Bell Labs Report dated November 13, 1999 annexed hereto as Exhibit B;

5. The proposed shared use of the SpectraSite Facility would not require any water or sanitary facilities, or generate air emissions or discharges to water bodies. Further, the installation will not generate any traffic other than for periodic maintenance visits.

D. Economic Feasibility As evidenced in Exhibit A annexed hereto, the Applicant and the tower owner have entered into a mutual agreement to share use of the SpectraSite Facility on terms agreeable to both parties. The proposed tower sharing is therefore economically feasible.

E. Public Safety As stated above and evidenced in the Bell Labs Report annexed hereto as Exhibit B, the operation of AT&T Wireless' antennas at this site would not exceed the total radio frequency electromagnetic radiation power density level adopted by the FCC and Connecticut Department of Health. Additionally, the compound is completely fenced for security purposes. Further, the addition of AT&T Wireless' telecommunications service in the Wallingford area through shared use of the SpectraSite Facility is expected to enhance the safety and welfare of local residents and travelers through the area resulting in an improvement to public safety in this area of Wallingford.

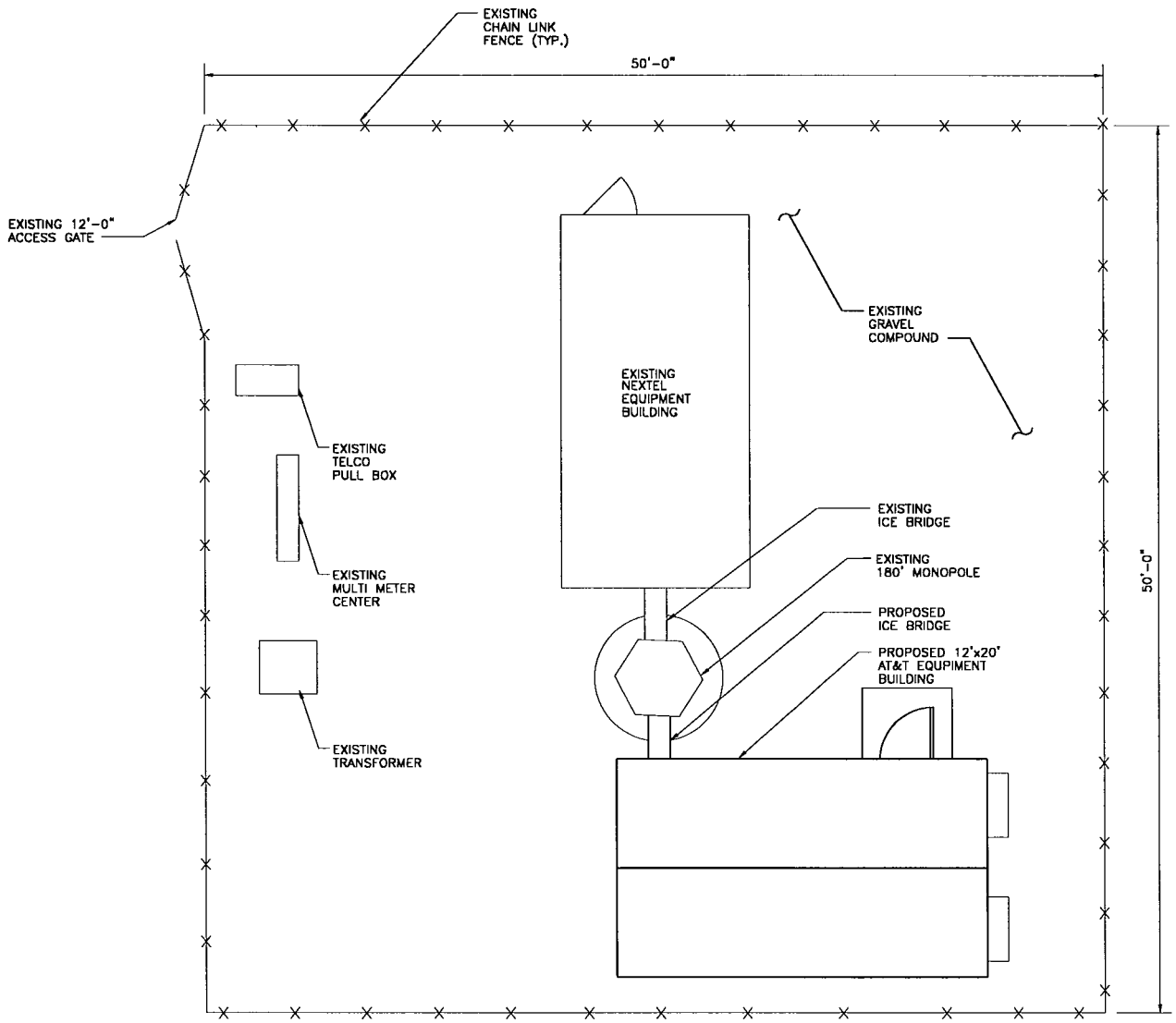
Conclusion

As delineated above, the proposed shared use of the SpectraSite Facility satisfies the criteria set forth in C.G.S. § 16-50aa, and advances the General Assembly's and the Siting Council's goal of preventing the proliferation of towers in the State of Connecticut. AT&T Wireless therefore requests the Siting Council issue an order approving the proposed shared use of the SpectraSite Facility.

Respectfully submitted,

Christopher B. Fisher, Esq.
On behalf of AT&T Wireless

cc: Mayor, Town of Wallingford

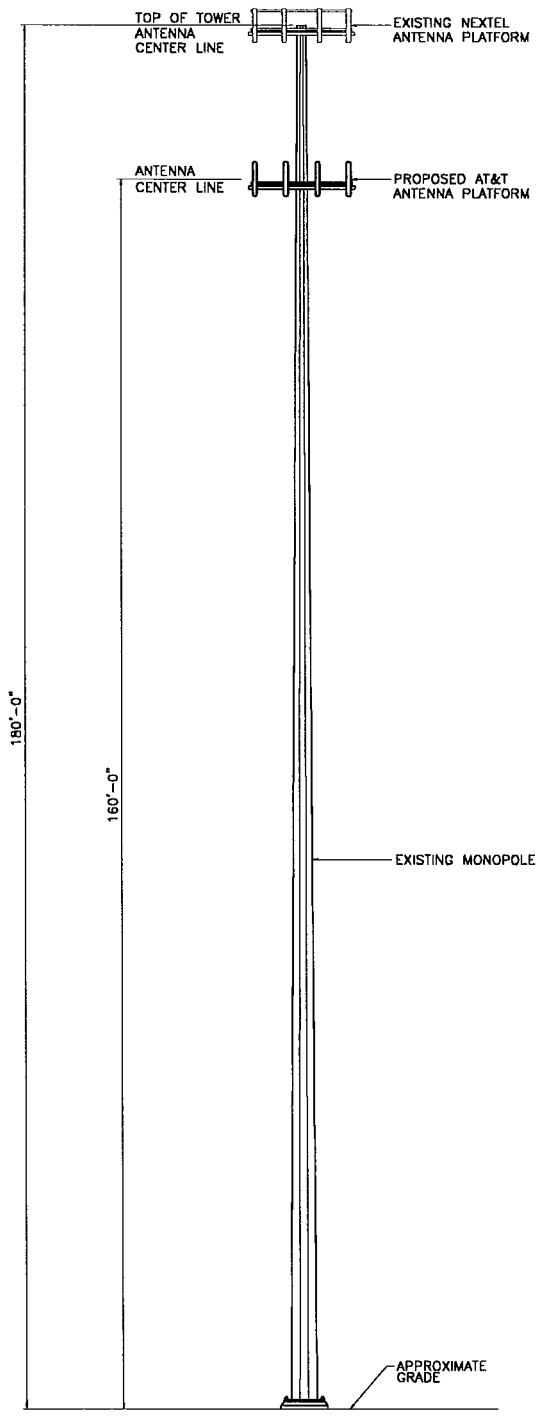


1 / SC-1 **COMPOUND PLAN**

SCALE: 1"=10'

0 5 10 20

SITE ID NO: CT-173	URS Greiner Woodward Clyde A-E-S 500 ENTERPRISE DRIVE ROCKY HILL, CONNECTICUT 1-(860)-529-8882	AT&T WIRELESS PCS, INC. UNMANNED WIRELESS COMMUNICATION EQUIPMENT SITE
Designed by:		SITE ADDRESS: YALESVILLE 90 NORTH PLAINS INDUSTRIAL ROAD WALLINGFORD, CT
Drawn by: JMP		REV. / DATE: / DESCRIPTION
Checked by:		Scale: AS SHOWN · Date: 12-06-99 Job No. F301824.81 · File No. SC-1
		Dwg. No. SC-1 Dwg. 1 of 2



1 / SC-2 **TOWER ELEVATION**
SCALE: 1"=25'

0 5 10 15 20 25 50

SITE ID NO: CT-173	URS Greiner Woodward Clyde A-E-S 500 ENTERPRISE DRIVE ROCKY HILL, CONNECTICUT 1-(860)-529-8882	AT&T WIRELESS PCS, INC. UNMANNED WIRELESS COMMUNICATION EQUIPMENT SITE
Designed by: JMP		SITE ADDRESS: YALESVILLE 90 NORTH PLAINS INDUSTRIAL ROAD WALLINGFORD, CT
Drawn by:		
Checked by:		

REV.	DATE:	DESCRIPTION

Dwg. No. SC-2

Scale: AS SHOWN | Date: 12-06-99

Job No.F301824.81 | File No. SC-2 | Dwg. 2 of 2

IN WITNESS WHEREOF, the parties hereto have set their hands as of the signature date set forth below.

SpectraSite:

SpectraSite Communications, Inc., a Delaware corporation

By: _____
Printed Name: Scot Lloyd
Title: Vice President
Signature Date: 11-23-99

User:

AT&T WIRELESS PCS, LLC

By: AT&T Wireless Services, Inc.,
Its manager

By: _____ 11/15/99

Paul A. Spurlock
System Development Manager

Bell Labs
Innovations for Lucent Technologies

Lucent Technologies

An Analysis of the Radiofrequency Environment in the Vicinity of a Proposed Personal Communications Services Base Station Site CT-173: 90 North Plains Industrial Road, Wallingford, Connecticut

Prepared by

Wireless & Optical Technologies Safety Department
Bell Laboratories
Murray Hill, New Jersey 07974-0636

Prepared for

Carmen Chapman
AT&T Wireless Services
15 E. Midland Avenue
Paramus, New Jersey 07652

November 13, 1999

Table of Contents

An Analysis of the Radiofrequency Environment in the Vicinity of a Proposed Personal Communications Services Base Station Site CT-173: 90 North Plains Industrial Road, Wallingford, Connecticut

Summary

This report is an analysis of the radiofrequency (RF) environment surrounding the AT&T Wireless Services personal communications services (PCS) facility proposed for installation in Wallingford, CT. The analysis includes contributions from co-located Nextel Communications enhanced specialized mobile radio (ESMR) antennas. The analysis utilizes engineering data provided by AT&T Wireless together with well-established analytical techniques utilized for calculating the RF fields associated with these types of transmitting antennas. Worst-case assumptions were used to ensure safe-side estimates, i.e., the actual values will be significantly lower than the corresponding analytical values. The maximum level of RF energy associated with each transmitting antenna was compared with the appropriate frequency-dependent exposure limit, and these individual comparisons were combined to ensure that the total RF environment is in compliance with safety guidelines.

The results of this analysis indicate that the *total* maximum level of RF energy in normally accessible areas surrounding the installation is below all applicable health and safety limits. Specifically, the maximum level of RF energy associated with *simultaneous and continuous operation of all co-located transmitters* will be less than 0.05% of the safety criteria adopted by the Federal Communications Commission as mandated by the Telecommunications Act of 1996. The Telecommunications Act of 1996 is the applicable Federal law with respect to consideration of the environmental effects of RF emissions in the siting of personal wireless facilities. The total maximum level of RF energy will also be less than 0.05% of the exposure limits of ANSI, IEEE, NCRP and the limits used by all states that regulate RF exposure.

1. Introduction

This report was prepared in response to a request from AT&T Wireless Services for an analysis of the radiofrequency (RF) environment in the vicinity of the proposed personal communications services (PCS) facility, and an opinion regarding the concern for public health associated with long-term exposure in this environment. The analysis includes contributions to the RF environment from operation of existing Nextel Communications enhanced specialized mobile radio (ESMR) antennas.

The Telecommunications Act of 1996[1] is the applicable *Federal law* with respect to consideration of environmental effects of RF emissions in the siting of wireless facilities. Regarding personal wireless services, e.g., PCS and ESMR, Section 704 of the Telecommunications Act of 1996 states the following:

> "No State or local government or instrumentality thereof may regulate the placement, construction, and modification of personal wireless service facilities on the basis of the environmental effects of radio frequency emissions to the extent that such facilities comply with the Commission's regulations concerning such emissions."

Therefore, the purpose of this report is to ensure that the total RF environment associated with these facilities complies with Federal Communications Commission (FCC) guidelines as required by the Telecommunications Act of 1996.

2. Technical Data

The proposed AT&T Wireless Services PCS antennas are to be mounted to a monopole located at 90 North Plains Industrial Road in Wallingford, CT. Co-located at the installation are Nextel Communications ESMR antennas. PCS antennas transmit at frequencies between 1930 and 1990 million-hertz (MHz); ESMR antennas transmit between 851 and 866 MHz (frequencies formerly used for UHF television broadcast.)

The actual RF power propagated from a PCS or an ESMR antenna is usually less than 10 watts per transmitter (channel) and the actual *total* RF power is usually less than 200 watts per sector (assuming the maximum number of transmitters are installed and operate *continuously at maximum power*). These are extremely low power systems when compared with other familiar radio systems such as AM, FM, and television broadcast, which operate upwards of 50,000 watts. The attached figure, which depicts the electromagnetic spectrum, lists familiar uses of RF energy. Table 1 lists engineering specifications for the co-located installations.

3. Environmental Levels of RF Energy

The antennas used for PCS and ESMR propagate most of the RF energy in a relatively narrow beam (in the vertical plane) directed toward the horizon. The small amount of energy that is directed along radials below the horizon results in a RF environment directly under the antennas that is not remarkably different from the environment at points more distant.

The methodology used to calculate the exposure levels follows that outlined by the FCC in OET Bulletin No. 65[1] and is explained in detail in the attached Appendix. For the case at hand, the maximal potential exposure levels associated with *simultaneous and continuous operation* of all

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1. Federal Communications Commission Office of Engineering & Technology, *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Radiation,* OET Bulletin No. 65, Edition 97-01 (August 1997).

proposed and existing transmitters can be readily calculated at any point in a plane at any height above grade. Based on the information shown in Table 1, the maximum power densities associated with all co-located facilities are shown in Table 2 for 6 ft and 16 ft above grade. The values for 16 ft above grade are representative of the maximum power densities immediately outside the second floor of nearby buildings (assuming level terrain). The values in Table 2 are also shown as a percentage of the FCC's maximum permissible exposure (MPE) values found in the Telecommunications Act of 1996 (specifically, in the FCC *Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation* [2]).

These power density values are the theoretical maxima that could occur and are not typical values. For example, the calculations include the effect of 100% field reinforcement from in-phase reflections. Experience has shown that the analytical technique used is extremely conservative. That is, actual power density levels have always been found to be smaller than the corresponding calculated levels [3]. Also, levels inside nearby homes and buildings will be lower than those immediately outside because of the high attenuation of common building materials at these frequencies and, hence, will not be significantly different from typical ambient levels.

4. Comparison of Environmental Levels with RF Safety Criteria

Table 2 shows the calculated maximal RF power density levels in the vicinity of the proposed and existing antennas; Table 3 shows federal, state and consensus exposure limits for human exposure to RF energy at the frequencies of interest. With respect to FCC limits for public exposure, comparisons of the weighted and combined analytical results indicate that the maximal levels associated with these antennas is at least 2000 times below the MPE, i.e., less than 0.05% of the MPE.

5. Discussion of Safety Criteria

Publicity given to speculation about possible associations between health effects and exposure to magnetic fields from electric-power distribution lines, electric shavers and from the use of hand-held cellular telephones has heightened concern among some members of the public about the possibility that health effects may be associated with any exposure to electromagnetic energy. Many people feel uneasy about new or unfamiliar technology and often want absolute proof that something is safe. Such absolute guarantees are not possible since it is virtually impossible to prove that something does not exist. However, sound judgments can be made as to the safety of a physical agent based on the weight of the pertinent scientific evidence. This is exactly how safety guidelines are developed.

The overwhelming weight of scientific evidence unequivocally indicates that biological effects associated with exposure to RF energy are threshold effects, i.e., unless the exposure level is sufficiently high the effect will not occur regardless of exposure duration. (Unlike ionizing radiation, e.g., X-rays and nuclear radiation, repeated exposures to low level RF radiation, or nonionizing radiation, are not cumulative.) Thus, it is relatively straightforward to derive safety limits. By adding safety factors to the threshold level at which the most sensitive effect occurs, conservative exposure guidelines have been developed to ensure safety.

At present, there are more than 10,000 reports in the scientific literature which address the subject of RF bioeffects. These reports, most of which describe the results of epidemiology studies, animal and cell-culture studies, have been critically reviewed by leading researchers in the field and all new studies are continuously being reviewed by various groups and organizations whose interest is developing health standards. These include the U.S.

Environmental Protection Agency, the National Institute for Occupational Safety and Health, the National Council on Radiation Protection and Measurements, the standards committees sponsored by the Institute of Electrical and Electronics Engineers, the International Radiation Protection Association under the sponsorship of the World Health Organization, and the National Radiological Protection Board of the UK. All of these groups have recently either reaffirmed existing health standards, developed and adopted new health standards, or proposed health standards for exposure to RF energy.

For example, in 1986, the National Council on Radiation Protection and Measurements (NCRP) published recommended limits for occupational and public exposure[4]. These recommendations were based on the results of an extensive critical review of the scientific literature by a committee of the leading researchers in the field of bioelectromagnetics. The literature selected included many controversial studies reporting effects at low levels. The results of all studies were weighed, analyzed and a consensus obtained establishing a conservative threshold upon which safety guidelines should be based. This threshold corresponds to the level at which the most sensitive, reproducible effects that could be related to human health were reported in the scientific literature. Safety factors were incorporated to ensure that the resulting guidelines would be at least ten to fifty times lower than the established threshold, even under worst-case exposure conditions. The NCRP recommended that continuous occupational exposure or exposure of the public should not exceed approximately those values indicated in Table 3. (See Table 3 for a summary of the corresponding safety criteria recommended by various organizations throughout the world.)

In July of 1986, the Environmental Protection Agency published a notice in the Federal Register, calling for public comment on recommended guidance for exposure of the public[5]. Three different limits were proposed. In 1987 the EPA abandoned its efforts and failed to adopt official federal exposure guidelines. However, in 1993 and 1996 the EPA, in its comments on the FCC's Notice of Proposed Rule Making to adopt safety guidelines[6], recommended adoption of the 1986 NCRP limits[4].

In September 1991, the RF safety standard developed by Subcommittee 4 of the Institute of Electrical and Electronics Engineers (IEEE) Standards Coordinating Committee SCC-28 was approved by the IEEE Standards Board[7]. (Until 1988 IEEE SCC-28 was known as the American National Standards Institute (ANSI) C95 Committee—established in 1959.) In November 1992, the ANSI Board of Standards Review approved the IEEE standard for use as an American National Standard. The limits of this standard are identical to the 1982 ANSI RFPGs[8] for occupational exposure and approximately one-fifth of these values for exposure of the general public at the frequencies of interest. Like those of the NCRP, these limits resulted from an extensive critical review of the scientific literature by a large committee of preeminently qualified scientists, most of whom were from academia and from research laboratories of federal public health agencies.

The panels of scientists from the World Health Organization's International Commission on Non-Ionizing Radiation Protection (ICNIRP)[9] and the National Radiological Protection Board in the United Kingdom[10] independently developed and in 1993 published guidelines similar to those of ANSI/IEEE. In 1997, after another critical review of the latest scientific evidence, ICNIRP reaffirmed the limits published in 1993[11]. Also, what was formerly the USSR, which traditionally had the lowest exposure guides, twice has revised upward its limits for public exposure. Thus, there is a converging consensus of the world's scientific community as to what constitutes safe levels of exposure.

Finally, in implementing the National Environmental Policy Act regarding potentially hazardous RF radiation from radio services regulated by the FCC, the Commission's Rules require that licensees filing applications after January 1, 1997[2] ensure that their facilities will comply with the 1996 FCC MPE limits outlined in 47 CFR §1.1310[2][3]. (Under the terms of the Telecommunications Act of 1996, no local government may regulate the placement of wireless facilities based on RF emissions to the extent that these emissions comply with the FCC regulations [1].)

With respect to the co-located antennas, be assured that the actual exposure levels in the vicinity of the Wallingford, CT installation will be below any health standard used anywhere in the world and literally thousands of times below any level reported to be associated with any verifiable functional change in humans or laboratory animals. This holds true even when all transmitters operate *simultaneously and continuously at their highest power.* Power density levels of this magnitude are not even a subject of speculation with regard to an association with adverse health effects.

6. For Further Information

Anyone interested can obtain additional information about the environmental impact of PCS and ESMR communications from:

Dr. Robert Cleveland, Jr.
Federal Communications Commission
Office of Engineering and Technology
Room 7002
2000 M Street NW
Washington, DC 20554
(202) 418-2422

2. The FCC extended the transition period to October 15, 1997. Second Memorandum Opinion and Order and Notice of Proposed Rulemaking, ET Docket 93-62, FCC 97-303, adopted August 25, 1997. Prior to this date the FCC required most licensees to comply with 1982 ANSI C95.1 limits.

3. Although all FCC licensees will be required to comply with 47 CFR §1.1310 limits, the FCC will continue to exclude certain land mobile services from proving compliance with these limits 47 CFR §1.1307. Previously, although licensees had to comply with the 1982 ANSI C95.1 limits, the FCC categorically excluded land mobile services, including paging, cellular, ESMR and two-way radio, from hazard analyses because "individually or cumulatively they do not have a significant effect on the quality of the human environment"[12]. The FCC pointed out that there was no evidence of excessive exposure to RF radiation during routine normal operation of these radio services.

7. Conclusion

This report is an analysis of the radiofrequency (RF) environment surrounding the AT&T Wireless Services personal communications services (PCS) facility proposed for installation in Wallingford, CT. The analysis includes contributions from co-located Nextel Communications enhanced specialized mobile radio (ESMR) antennas. The analysis utilizes engineering data provided by AT&T Wireless together with well-established analytical techniques utilized for calculating the RF fields associated with these types of transmitting antennas. Worst-case assumptions were used to ensure safe-side estimates, i.e., the actual values will be significantly lower than the corresponding analytical values. The maximum level of RF energy associated with each transmitting antenna was compared with the appropriate frequency-dependent exposure limit, and these individual comparisons were combined to ensure that the total RF environment is in compliance with safety guidelines.

The results of this analysis indicate that the *total* maximum level of RF energy in normally accessible areas surrounding the installation is below all applicable health and safety limits. Specifically, the maximum level of RF energy associated with *simultaneous and continuous operation of all co-located transmitters* will be less than 0.05% of the safety criteria adopted by the Federal Communications Commission as mandated by the Telecommunications Act of 1996. The Telecommunications Act of 1996 is the applicable Federal law with respect to consideration of the environmental effects of RF emissions in the siting of personal wireless facilities. The total maximum level of RF energy will also be less than 0.05% of the exposure limits of ANSI, IEEE, NCRP and the limits used by all states that regulate RF exposure.

8. References

[1] Telecommunications Act of 1996, Title VII, Section 704, *Facilities Siting; Radio Frequency Emissions Standards*

[2] Federal Communication Commission 47 CFR Parts 1, 2, 15, 24 and 97. "*Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation.*" (August 6, 1996)

[3] Petersen, R.C., and Testagrossa, P.A., "Radiofrequency Fields Associated with Cellular-Radio Cell-Site Antennas," *Bioelectromagnetics*, Vol. 13, No. 6. (1992)

[4] *Biological Effects and Exposure Criteria for Radio Frequency Electromagnetic Fields,* NCRP Report No. 86, National Council on Radiation Protection and Measurements, Bethesda, MD. (1986)

[5] Federal Register, Vol. 51, No. 146, Wednesday, July 30, 1986.

[6] Notice of Proposed Rule Making *In the Matter of Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation*, August 13, 1993. ET Docket No. 93-62

[7] *IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz,* ANSI/IEEE C95.1-1992, Institute of Electrical and Electronics Engineers, Piscataway, NJ. (1991)

[8] American National Standard *Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300 kHz to 100 GHz,* ANSI C95.1-1982, American National Standards Institute, New York, NY. (1982)

[9] *Electromagnetic Fields (300 Hz to 300 GHz),* Environmental Health Criteria 137, World Health Organization, Geneva, Switzerland. (1993)

[10] *Board Statement on Restrictions on Human Exposure to Static and Time Varying Electromagnetic Fields and Radiation,* Documents of the NRPB, Vol. 4, No. 5, National Radiological Protection Board, Chilton, Didcot, Oxon, United Kingdom. (1993)

[11] "Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz) - ICNIRP Guidelines," *Health Physics*, Vol. 74, No. 4, pp. 494-522. (1998)

[12] Action by the Commission February 12, 1987, by Second Report and Order (FCC 87-63), and Third Notice of Proposed Rulemaking (FCC 87-64). General Docket No. 79-144.

Table 1: Engineering Specifications for the Proposed and Existing Radio Systems Wallingford, CT

Site Specifications	AT&T Wireless	Nextel
maximum ERP† per channel	100 watts	100 watts
actual radiated power per channel	4 watts	6.3 watts
actual *total* radiated power per sector	32 watts	50.4 watts
number of transmit/receive antennas	N/A	3 per sector
number of transmit antennas	1 per sector	N/A
number of receive antennas	2 per sector	N/A
maximum number of transmitters	8 per sector	8 per sector
number of sectors configured	3	3
antenna centerline height above grade	130 ft	140 ft
antenna manufacturer	Allgon	Swedcom
model number	7184.14	ALP 9212
gain	16.15 dBi	14.15 dBi
type	directional	directional
downtilt	2° (electrical)	0°

† *Effective Radiated Power* - ERP is a measure of how well an antenna concentrates RF energy; it is not the actual power radiated from the antenna. To illustrate the difference, compare the brightness of an ordinary 100 watt light bulb with that from a 100 watt spot-light. Even though both are 100 watts, the spot-light appears brighter because it concentrates the light in one direction. In this direction, the spot-light effectively appears to be emitting more than 100 watts. In other directions, there is almost no light emitted by the spot-light and it effectively appears to be much less than 100 watts.

Table 2: Calculated Maximal Levels and the Levels as a Percentage of 1996 FCC MPEs* for the Proposed and Existing Antennas, Wallingford, CT

Provider	Power Density (mW/cm^2)		% of MPEs*	
	6 ft AMGL†	16 ft AMGL†	6 ft AMGL†	16 ft AMGL†
AT&T Wireless Services				
maximum anywhere	< 0.00018	< 0.00021	0.02%	0.03%
at base of structure	< 0.00008	< 0.00010	0.01%	0.01%
Nextel Communications				
maximum anywhere	< 0.00006	< 0.00007	0.02%	0.02%
at base of structure	< 0.00001	< 0.00001	0.01%	0.01%
TOTAL				
maximum anywhere			0.04%	0.05%
at base of structure			0.02%	0.02%

* MPE: The FCC limits for maximum permissible exposure (same as 1986 NCRP limits at the frequencies of interest).
† AMGL: above mean grade level

Table 3: Summary of International, Federal, State and Consensus Safety Criteria for Exposure to Radiofrequency Energy at Frequencies Used for PCS and ESMR

Organization/Government Agency	Exposure Population	Power Density (mW/cm^2)	
		ESMR	PCS
International Safety Criteria/Recommendations			
International Commission on Non-Ionizing Radiation Protection (1997)	Occupational	2.07	4.88
(*Health Physics* 74:4, 494-522. 1998)[1]	Public	0.42	0.98
National Radiological Protection Board	Occupational	5.00	10.00
(NRPB, 1993)	Public	2.79	10.00
Federal Requirements			
Federal Communications Commission	Occupational	2.75	5.00
(47 CFR §1.1310)	Public	0.55	1.00[1]
Consensus Standards and Recommendations			
American National Standards Institute	Occupational	2.75	5.00
(ANSI C95.1 - 1982)	Public	2.75	5.00
Institute of Electrical and Electronics Engineers	Occupational	2.75	6.50
(ANSI/IEEE C95.1-1999 Edition)[2]	Public	0.55	1.30
National Council on Radiation Protection & Measurements	Occupational	2.75	5.00
(NCRP Report 86, 1986)	Public	0.55	1.00
State Codes			
New Jersey (NJAC 7:28-42)	Public	2.75	5.00
Massachusetts (Department of Health 105 CMR 122)	Public	0.55	1.00
New York State[3]	Public	0.55	1.00

NOTES:

1. Reaffirmed in 1997 and published with modification in 1998.
2. Incorporating IEEE Standard C95.1-1991 and IEEE Standard C95.1a-1998.
3. State of New York Department of Health follows NCRP Report 86.

APPENDIX - Analytical Technique

This appendix describes the methodology used to predict the radiofrequency (RF) electromagnetic environment surrounding the proposed AT&T PCS antennas and all co-located wireless communications antennas. As a conservative measure, the methodology applies "worst-case" conditions that result in an over-estimate of the RF environment, e.g., the calculations include the effect of field reinforcement from in-phase reflections. Therefore, the predicted values are the theoretical maxima that could occur and not typical values. The actual power density levels have always been found to be smaller than the corresponding predicted levels[4]. The methodology described follows that outlined by the Federal Communications Commission (FCC) in their OST Bulletin No. 65[5].

For each transmitting antenna, the maximum RF power density at 6 ft above grade was estimated by performing a series of power density predictions for depression angles below the horizon from 5° to 90°. This was done using the vertical gain pattern of each antenna provided by the antenna manufacturer and by using the following equation:

$$S = \left(\frac{N \times P_N \times G_\theta \times 1.64}{4\pi R^2} \right)$$

and

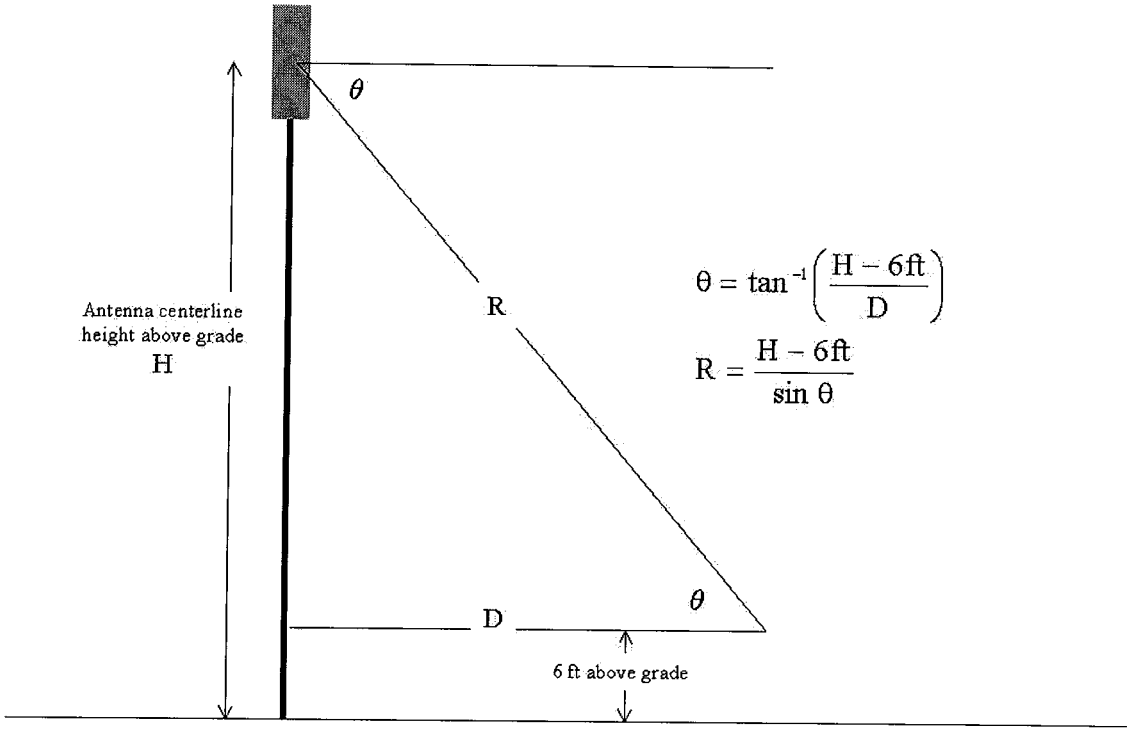
$$S_{max} = 4 \times S$$

where:

S	= plane wave equivalent power density
S_{max}	= factor of 4 assumes a 100% ground reflection (resulting in a doubling of the field strength and a four-fold increase in power density)
N	= maximum number of transmitters (channels)
P_N	= actual power per channel input to the antenna
G_θ	= far-field gain (numeric) of the antenna relative to a half-wave dipole in the direction of point of interest
R	= distance (radial or slant) from the antenna center to point of interest
1.64	= gain of a half-wave dipole (2.15 dB) over an isotropic radiator

4. Petersen, R.C., and Testagrossa, P.A., Radiofrequency Fields Associated with Cellular-Radio Cell-Site Antennas, *Bioelectromagnetics, Vol. 13, No. 6 (1992).*

5. Federal Communications Commission Office of Engineering & Technology, *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Radiation,* OET Bulletin No. 65, Edition 97-01 (August 1997).



Based on the technical specifications for the site outlined in Table 1, the maximum RF power density (S_{max}) associated with the AT&T PCS antennas occurs at a depression angle of 30° below the horizon and is calculated as follows:

$$R = (H-6)/\sin\theta = (130-6)/\sin(30°) = 248 \text{ ft}$$

$G_{30°} = -2.2$ dBd (from antenna elevation gain pattern)

$$P_N = ERP/G_{max} = \frac{100}{10^{(14dBd/10)}} = 3.98 \text{ watts per channel}$$

$$S_{max} = 4 \times \frac{N \times P_N \times 10^{(G\theta/10)} \times 1.64}{4 \times \pi \times R^2}$$

$$S_{max} = 4 \times \frac{8ch \times 3.98W/ch \times 10^{(-2.2dBd/10)} \times 1.64}{4 \times \pi \times (248ftx12x2.54)^2}$$

$$S_{max} = 1.8 \times 10^{-7} \text{ W/cm}^2 = 0.00018 \text{ mW/cm}^2$$

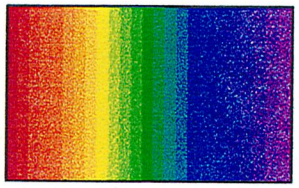
ELECTROMAGNETIC SPECTRUM

Non-Ionizing Radiation

Ionizing Radiation

ELF, VF | Radio Frequencies | Infrared | UV | X-rays, γ-rays

Light



AM Radio: *535 - 1605 kHz*

CB Radio: *27 MHz*

Cordless Phones: *49 MHz*

TV Ch 2-6: *54 - 88 MHz*

FM Radio: *88 - 108 MHz*

Marine Radio: *160 MHz*

TV Ch 7-13: *174 - 216 MHz*

TV UHF Ch 14-69: *470 - 800 MHz*

Cellular Radio, Specialized Mobile Radio, Paging: *806 - 946 MHz*

Antitheft devices: *10-20 kHz and/or 915 MHz*

Microwave oven: *915 and 2450 MHz*

Personal Communication Services: *1800 - 2200 MHz*

Intrusion alarms / door openers: *10.5 GHz*

Microwave radio: *1 - 40 GHz*

Satellite Communications: *100 MHz - 275 GHz*

Power Frequency

10^3 10^6 10^9 10^{12} 10^{15} 10^{18}

60 Hz 1kHz 1MHz 1GHz Frequency (Hz) →

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LOUIS R. TAFFERA

December 17, 1999

BY FAX & OVERNIGHT MAIL
Steven Levine, Esq.
Connecticut Siting Council
10 Franklin Square
New Britian, Connecticut 06051

Re: AT&T Wireless PCS, LLC d/b/a AT&T Wireless Services
Tower Sharing @ SpectraSite Facilities
Northrup Road, Wallingford
90 North Plains Industrial Road, Wallingford

Dear Mr. Levine:

On behalf of AT&T Wireless Services, enclosed please find additional information that you had requested with respect to its shared use filings at two SpectraSite facilities in the Town of Wallingford.

Specifically, regarding the facility located at 90 North Plains Industrial Road we enclose a letter from URS Greiner Woodward Clyde regarding the structural integrity of the Nextel monopole now owned by SpectraSite and a revised Bell Labs report dated December 16, 1999, reflecting the radio frequency environment for Nextel's existing antennas at a centerline of 180' and AT&T's proposed antennas at a centerline of 160'. Further, the latitude and longitude for the existing monopole is 41-28-52N, 72-49-09W, respectively.

Additionally, with regard to the facility located on Northrup Road, our title investigation has indicated that the underlying property leased by SpectraSite is owned by Anthony D. Autorino and is known as parcel 009-001-003 more commonly referred to as 992 Northrup Road. Given the existence of only one tower in this area of Wallingford, any prior filings by others erroneously identified the property as 100 Northrup Road.

Thank you for your continued assistance on these matters.

Very Truly Yours,

Christopher B. Fisher

Encs
cc: Carmen Chapman
Jennifer Gaudet

URS Greiner Woodward Clyde
A Division of URS Corporation

500 Enterprise Drive, Suite 3B
Rocky Hill, CT 06067
Tel: 860.529.8882
Fax: 860.529.3991
Offices Worldwide

December 16, 1999

Mortimer A. Gelston
Chairman
Connecticut State Siting Council
10 Franklin Square
New Britain, CT 06051

Reference: Proposed Telecommunications Facility
AT&T Site No. CT-173
NEXTEL Monopole
North Plains Industrial Road
Wallingford, Connecticut
F300001824.81

Dear Mr. Gelston:

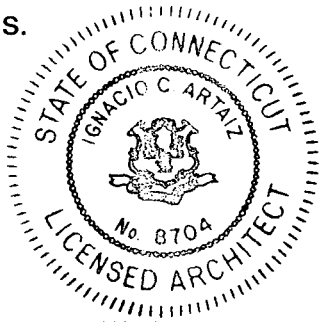
URS Greiner Woodward Clyde (URSGWC) has reviewed original design calculations for the NEXTEL monopole located at 90 North Plains Industrial Road, Wallingford, Connecticut. This office has concluded that the existing monopole will support the additional loads of the AT&T Wireless PCS antennas to the requirements of EIA/TIA-222-F.

Please contact me if there are any questions.

Sincerely,

URS Greiner Woodward Clyde A.E.S.

Ignacio C. Artaiz, AIA
Project Manager



ICA/eh
cc: Carmen Chapman, AT&T
Christopher Fisher, Cuddy & Feder & Worby
Jennifer Gaudet, Pinnacle
D. Roberts, URSGWC
A. Abadjian, URSGWC

An Analysis of the Radiofrequency Environment in the Vicinity of a Proposed Personal Communications Services Base Station Site CT-173: 90 North Plains Industrial Road, Wallingford, Connecticut

Prepared by

Wireless & Optical Technologies Safety Department
Bell Laboratories
Murray Hill, New Jersey 07974-0636

Prepared for

Carmen Chapman
AT&T Wireless Services
149 Water Street
Suite 2C & 2D
Norwalk, CT 06854

December 16, 1999

Table of Contents

An Analysis of the Radiofrequency Environment in the Vicinity of a Proposed Personal Communications Services Base Station Site CT-173: 90 North Plains Industrial Road, Wallingford, Connecticut

Summary

This report is an analysis of the radiofrequency (RF) environment surrounding the AT&T Wireless Services personal communications services (PCS) facility proposed for installation in Wallingford, CT. The analysis, which includes contributions from co-located enhanced specialized mobile radio (ESMR) antennas, utilizes engineering data provided by AT&T Wireless together with well-established analytical techniques utilized for calculating the RF fields associated with these types of transmitting antennas. Worst-case assumptions were used to ensure safe-side estimates, i.e., the actual values will be significantly lower than the corresponding analytical values. The maximum level of RF energy associated with each transmitting antenna was compared with the appropriate frequency-dependent exposure limit, and these individual comparisons were combined to ensure that the total RF environment is in compliance with safety guidelines.

The results of this analysis indicate that the *total* maximum level of RF energy in normally accessible areas surrounding the installation is below all applicable health and safety limits. Specifically, the maximum level of RF energy associated with *simultaneous and continuous operation of all co-located transmitters* will be less than 0.03% of the safety criteria adopted by the Federal Communications Commission as mandated by the Telecommunications Act of 1996. The Telecommunications Act of 1996 is the applicable Federal law with respect to consideration of the environmental effects of RF emissions in the siting of personal wireless facilities. The total maximum level of RF energy will also be less than 0.03% of the exposure limits of ANSI, IEEE, NCRP and the limits used by all states that regulate RF exposure.

1. Introduction

This report was prepared in response to a request from AT&T Wireless Services for an analysis of the radiofrequency (RF) environment in the vicinity of the proposed personal communications services (PCS) facility, and an opinion regarding the concern for public health associated with long-term exposure in this environment. The analysis includes contributions to the RF environment from operation of co-located Nextel Communications enhanced specialized mobile radio (ESMR) antennas.

The Telecommunications Act of 1996[1] is the applicable *Federal law* with respect to consideration of environmental effects of RF emissions in the siting of wireless facilities. Regarding personal wireless services, e.g., PCS and ESMR, Section 704 of the Telecommunications Act of 1996 states the following:

> "No State or local government or instrumentality thereof may regulate the placement, construction, and modification of personal wireless service facilities on the basis of the environmental effects of radio frequency emissions to the extent that such facilities comply with the Commission's regulations concerning such emissions."

Therefore, the purpose of this report is to ensure that the total RF environment associated with these facilities complies with Federal Communications Commission (FCC) guidelines as required by the Telecommunications Act of 1996.

2. Technical Data

The proposed PCS antennas are to be mounted to a monopole located at 90 North Plains Industrial Road in Wallingford, CT. Co-located at the installation are Nextel Communications ESMR antennas. PCS antennas transmit at frequencies between 1930 and 1990 million-hertz (MHz). The ESMR antennas transmit at frequencies between 851 and 866 MHz.

The actual RF power propagated from a PCS or ESMR antenna is usually less than 10 watts per transmitter (channel) and the actual *total* RF power is usually less than 200 watts per sector (assuming the maximum number of transmitters are installed and operate *continuously at maximum power*). These are extremely low power systems when compared with other familiar radio systems such as AM, FM, and television broadcast, which operate upwards of 50,000 watts. The attached figure, which depicts the electromagnetic spectrum, lists familiar uses of RF energy. Table 1 lists engineering specifications for the co-located installations.

3. Environmental Levels of RF Energy

The antennas used for PCS and ESMR propagate most of the RF energy in a relatively narrow beam (in the vertical plane) directed toward the horizon. The small amount of energy that is directed along radials below the horizon results in a RF environment directly under the antennas that is not remarkably different from the environment at points more distant.

The methodology used to calculate the exposure levels follows that outlined by the FCC in OET Bulletin No. 65[1] and is explained in detail in the Appendix. For the case at hand, the maximal

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1. Federal Communications Commission Office of Engineering & Technology, *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Radiation,* OET Bulletin No. 65, Edition 97-01 (August 1997).

potential exposure levels associated with *simultaneous and continuous operation* of co-located transmitters can be readily calculated at any point in a plane at any height above grade. Based on the information shown in Table 1, the maximum power densities associated with all proposed and existing transmitters at 6 ft and 16 ft above grade are shown in Table 2A. The values for 16 ft above grade are representative of the maximum power density immediately outside the second floor of nearby buildings (assuming level terrain). These levels are also shown in Table 2A as a percentage of the FCC's maximum permissible exposure (MPE) values found in the Telecommunications Act of 1996 (specifically, in the FCC *Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation* [2]).

The values shown in Table 2A are the theoretical maxima that could occur and are not typical values. For example, the calculations include the effect of 100% field reinforcement from in-phase reflections. Experience has shown that the analytical technique used is extremely conservative. That is, actual power density levels have always been found to be smaller than the corresponding calculated levels even when extrapolated to maximum use conditions (all transmitters operating simultaneously at maximum power) [3]. Also, levels inside nearby homes and buildings will be lower than those immediately outside because of the high attenuation of common building materials at these frequencies and, hence, will not be significantly different from typical ambient levels.

4. Comparison of Environmental Levels with RF Safety Criteria

Table 2A shows the calculated maximal RF power density levels in the vicinity of co-located antennas; Table 3 shows federal, state and consensus exposure limits for human exposure to RF energy at the frequencies of interest. Because the MPEs vary with frequency, the calculated RF levels for each transmitting antenna must first be compared with the appropriate MPE (the individual percentages are shown in Table 2A) and then these comparisons combined before compliance with safety guidelines can be shown. With respect to FCC limits for public exposure, comparisons of the weighted and combined analytical results indicate that the maximal levels associated with these antennas is at least 333 times below the MPE, i.e., less than 0.3% of the MPE.

5. Discussion of Safety Criteria

Publicity given to speculation about possible associations between health effects and exposure to magnetic fields from electric-power distribution lines, electric shavers and from the use of hand-held cellular telephones has heightened concern among some members of the public about the possibility that health effects may be associated with any exposure to electromagnetic energy. Many people feel uneasy about new or unfamiliar technology and often want absolute proof that something is safe. Such absolute guarantees are not possible since it is virtually impossible to prove that something does not exist. However, sound judgments can be made as to the safety of a physical agent based on the weight of the pertinent scientific evidence. This is exactly how safety guidelines are developed.

The overwhelming weight of scientific evidence unequivocally indicates that biological effects associated with exposure to RF energy are threshold effects, i.e., unless the exposure level is sufficiently high the effect will not occur regardless of exposure duration. (Unlike ionizing radiation, e.g., X-rays and nuclear radiation, repeated exposures to low level RF radiation, or nonionizing radiation, are not cumulative.) Thus, it is relatively straightforward to derive safety limits. By adding safety factors to the threshold level at which the most sensitive effect occurs, conservative exposure guidelines have been developed to ensure safety.

At present, there are more than 10,000 reports in the scientific literature which address the subject of RF bioeffects. These reports, most of which describe the results of epidemiology studies, animal and cell-culture studies, have been critically reviewed by leading researchers in the field and all new studies are continuously being reviewed by various groups and organizations whose interest is developing health standards. These include the U.S. Environmental Protection Agency, the National Institute for Occupational Safety and Health, the National Council on Radiation Protection and Measurements, the standards committees sponsored by the Institute of Electrical and Electronics Engineers, the International Radiation Protection Association under the sponsorship of the World Health Organization, and the National Radiological Protection Board of the UK. All of these groups have recently either reaffirmed existing health standards, developed and adopted new health standards, or proposed health standards for exposure to RF energy.

For example, in 1986, the National Council on Radiation Protection and Measurements (NCRP) published recommended limits for occupational and public exposure[4]. These recommendations were based on the results of an extensive critical review of the scientific literature by a committee of the leading researchers in the field of bioelectromagnetics. The literature selected included many controversial studies reporting effects at low levels. The results of all studies were weighed, analyzed and a consensus obtained establishing a conservative threshold upon which safety guidelines should be based. This threshold corresponds to the level at which the most sensitive, reproducible effects that could be related to human health were reported in the scientific literature. Safety factors were incorporated to ensure that the resulting guidelines would be at least ten to fifty times lower than the established threshold, even under worst-case exposure conditions. The NCRP recommended that continuous occupational exposure or exposure of the public should not exceed approximately those values indicated in Table 3. (See Table 3 for a summary of the corresponding safety criteria recommended by various organizations throughout the world.)

In July of 1986, the Environmental Protection Agency published a notice in the Federal Register, calling for public comment on recommended guidance for exposure of the public[5]. Three different limits were proposed. In 1987 the EPA abandoned its efforts and failed to adopt official federal exposure guidelines. However, in 1993 and 1996 the EPA, in its comments on the FCC's Notice of Proposed Rule Making to adopt safety guidelines[6], recommended adoption of the 1986 NCRP limits[4].

In September 1991, the RF safety standard developed by Subcommittee 4 of the Institute of Electrical and Electronics Engineers (IEEE) Standards Coordinating Committee SCC-28 was approved by the IEEE Standards Board[7]. (Until 1988 IEEE SCC-28 was known as the American National Standards Institute (ANSI) C95 Committee—established in 1959.) In November 1992, the ANSI Board of Standards Review approved the IEEE standard for use as an American National Standard. The limits of this standard are identical to the 1982 ANSI RFPGs[8] for occupational exposure and approximately one-fifth of these values for exposure of the general public at the frequencies of interest. Like those of the NCRP, these limits resulted from an extensive critical review of the scientific literature by a large committee of preeminently qualified scientists, most of whom were from academia and from research laboratories of federal public health agencies.

The panels of scientists from the World Health Organization's International Commission on Non-Ionizing Radiation Protection (ICNIRP)[9] and the National Radiological Protection Board in the United Kingdom[10] independently developed and in 1993 published guidelines similar to those of ANSI/IEEE. In 1997, after another critical review of the latest scientific evidence, ICNIRP

reaffirmed the limits published in 1993[11]. Also, what was formerly the USSR, which traditionally had the lowest exposure guides, twice has revised upward its limits for public exposure. Thus, there is a converging consensus of the world's scientific community as to what constitutes safe levels of exposure.

Finally, in implementing the National Environmental Policy Act regarding potentially hazardous RF radiation from radio services regulated by the FCC, the Commission's Rules require that licensees filing applications after January 1, 1997[2] ensure that their facilities will comply with the 1996 FCC MPE limits outlined in 47 CFR §1.1310[3][3]. (Under the terms of the Telecommunications Act of 1996, no local government may regulate the placement of wireless facilities based on RF emissions to the extent that these emissions comply with the FCC regulations [1].)

With respect to the proposed and existing antennas, be assured that the actual exposure levels in the vicinity of the Wallingford, CT installation will be below any health standard used anywhere in the world and literally thousands of times below any level reported to be associated with any verifiable functional change in humans or laboratory animals. This holds true even when all transmitters operate *simultaneously and continuously at their highest power*. Power density levels of this magnitude are not even a subject of speculation with regard to an association with adverse health effects.

6. For Further Information

Anyone interested can obtain additional information about the environmental impact of wireless communications from:

Dr. Robert Cleveland, Jr.
Federal Communications Commission
Office of Engineering and Technology
Room 7002
2000 M Street NW
Washington, DC 20554
(202) 418-2422

7. Conclusion

This report is an analysis of the radiofrequency (RF) environment surrounding the AT&T Wireless Services personal communications services (PCS) facility proposed for installation in Wallingford, CT. The analysis includes contributions from existing PCS, enhanced specialized mobile radio (ESMR), cellular radio and land mobile radio antennas. The analysis utilizes engineering data provided by AT&T Wireless together with well-established analytical techniques utilized for calculating the RF fields associated with these types of transmitting antennas. Worst-case assumptions were used to ensure safe-side estimates, i.e., the actual values will be significantly lower than the corresponding analytical values. The maximum level of RF energy associated with

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2. The FCC extended the transition period to October 15, 1997. Second Memorandum Opinion and Order and Notice of Proposed Rulemaking, ET Docket 93-62, FCC 97-303, adopted August 25, 1997. Prior to this date the FCC required most licensees to comply with 1982 ANSI C95.1 limits.

3. Although all FCC licensees will be required to comply with 47 CFR §1.1310 limits, the FCC will continue to exclude certain land mobile services from proving compliance with these limits 47 CFR §1.1307. Previously, although licensees had to comply with the 1982 ANSI C95.1 limits, the FCC categorically excluded land mobile services, including paging, cellular, ESMR and two-way radio, from hazard analyses because "individually or cumulatively they do not have a significant effect on the quality of the human environment"[12]. The FCC pointed out that there was no evidence of excessive exposure to RF radiation during routine normal operation of these radio services.

each transmitting antenna was compared with the appropriate frequency-dependent exposure limit, and these individual comparisons were combined to ensure that the total RF environment is in compliance with safety guidelines.

The results of this analysis indicate that the *total* maximum level of RF energy in normally accessible areas surrounding the installation is below all applicable health and safety limits. Specifically, the maximum level of RF energy associated with *simultaneous and continuous operation of all proposed and existing transmitters* will be less than 0.25% of the safety criteria adopted by the Federal Communications Commission as mandated by the Telecommunications Act of 1996. The Telecommunications Act of 1996 is the applicable Federal law with respect to consideration of the environmental effects of RF emissions in the siting of personal wireless facilities. The total maximum level of RF energy will also be less than 0.25% of the exposure limits of ANSI, IEEE, NCRP and the limits used by all states that regulate RF exposure.

8. References

[1] Telecommunications Act of 1996, Title VII, Section 704, *Facilities Siting; Radio Frequency Emissions Standards*

[2] Federal Communication Commission 47 CFR Parts 1, 2, 15, 24 and 97. "*Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation.*" (August 6, 1996)

[3] Petersen, R.C., and Testagrossa, P.A., "Radiofrequency Fields Associated with Cellular-Radio Cell-Site Antennas," *Bioelectromagnetics*, Vol. 13, No. 6. (1992)

[4] *Biological Effects and Exposure Criteria for Radio Frequency Electromagnetic Fields,* NCRP Report No. 86, National Council on Radiation Protection and Measurements, Bethesda, MD. (1986)

[5] Federal Register, Vol. 51, No. 146, Wednesday, July 30, 1986.

[6] Notice of Proposed Rule Making *In the Matter of Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation*, August 13, 1993. ET Docket No. 93-62

[7] *IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz,* ANSI/IEEE C95.1-1992, Institute of Electrical and Electronics Engineers, Piscataway, NJ. (1991)

[8] American National Standard *Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300 kHz to 100 GHz,* ANSI C95.1-1982, American National Standards Institute, New York, NY. (1982)

[9] *Electromagnetic Fields (300 Hz to 300 GHz),* Environmental Health Criteria 137, World Health Organization, Geneva, Switzerland. (1993)

[10] *Board Statement on Restrictions on Human Exposure to Static and Time Varying Electromagnetic Fields and Radiation,* Documents of the NRPB, Vol. 4, No. 5, National Radiological Protection Board, Chilton, Didcot, Oxon, United Kingdom. (1993)

[11] "Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz) - ICNIRP Guidelines," *Health Physics*, Vol. 74, No. 4, pp. 494-522. (1998)

[12] Action by the Commission February 12, 1987, by Second Report and Order (FCC 87-63), and Third Notice of Proposed Rulemaking (FCC 87-64). General Docket No. 79-144.

Table 1: Engineering Specifications for the Proposed and Existing Radio Systems Wallingford, CT

Site Specifications	AT&T Wireless	Nextel
maximum ERP† per channel	100 watts	100 watts
actual radiated power per channel	4 watts	6.3 watts
actual *total* radiated power per sector	32 watts	50.4 watts
number of transmit/receive antennas	N/A	3 per sector
number of transmit antennas	1 per sector	N/A
number of receive antennas	2 per sector	N/A
maximum number of transmitters	8 per sector	8 per sector
number of sectors configured	3	3
antenna centerline height above grade	160 ft	180 ft
antenna manufacturer	Allgon	Swedcom
model number	7184.14	ALP 9212
gain	16.15 dBi	14.15 dBi
type	directional	directional
downtilt	2° (electrical)	0°

† *Effective Radiated Power* - ERP is a measure of how well an antenna concentrates RF energy; it is not the actual power radiated from the antenna. To illustrate the difference, compare the brightness of an ordinary 100 watt light bulb with that from a 100 watt spot-light. Even though both are 100 watts, the spot-light appears brighter because it concentrates the light in one direction. In this direction, the spot-light effectively appears to be emitting more than 100 watts. In other directions, there is almost no light emitted by the spot-light and it effectively appears to be much less than 100 watts.

Table 2A: Calculated Maximal Levels and the Levels as a Percentage of 1996 FCC MPEs* for the Proposed and Existing Antennas, Wallingford, CT

Provider	Power Density (mW/cm^2)		% of MPEs*	
	6 ft AMGL†	16 ft AMGL†	6 ft AMGL†	16 ft AMGL†
AT&T Wireless	< 0.00011	< 0.00013	0.02%	0.02%
Nextel	< 0.00004	< 0.00004	0.01%	0.01%
		TOTAL	0.03%	0.03%

* MPE: The FCC limits for maximum permissible exposure (same as 1986 NCRP limits at the frequencies of interest)

† AMGL: above mean grade level

Table 2B: Calculated Levels At Base of Structure and the Levels as a Percentage of 1996 FCC MPEs* for the Proposed and Existing Antennas, Wallingford, CT

Provider	Power Density (mW/cm^2)		% of MPEs*	
	6 ft AMGL†	16 ft AMGL†	6 ft AMGL†	16 ft AMGL†
AT&T Wireless	< 0.00005	< 0.00006	0.01%	0.01%
Nextel	< 0.00001	< 0.00001	0.01%	0.01%
		TOTAL	0.02%	0.02%

* MPE: The FCC limits for maximum permissible exposure (same as 1986 NCRP limits at the frequencies of interest)

† AMGL: above mean grade level

Table 3: Summary of International, Federal, State and Consensus Safety Criteria for Exposure to Radiofrequency Energy at Frequencies Used for PCS and ESMR Systems

Organization/Government Agency	Exposure Population	Power Density ($\mu W/cm^2$)	
		ESMR	PCS
International Safety Criteria/Recommendations			
International Commission on Non-Ionizing Radiation Protection (1997)	Occupational	2062	4875
(*Health Physics* 74:4, 494-522. 1998)[1]	Public	412	975
National Radiological Protection Board	Occupational	5000	10,000
(NRPB, 1993)	Public	2790	10,000
Federal Requirements			
Federal Communications Commission	Occupational	2750	5000
(47 CFR §1.1310)	Public	550	1000
Consensus Standards and Recommendations			
American National Standards Institute	Occupational	2750	5000
(ANSI C95.1 - 1982)	Public	2750	5000
Institute of Electrical and Electronics Engineers	Occupational	2750	6500
(ANSI/IEEE C95.1-1999 Edition)[2]	Public	550	1300
National Council on Radiation Protection & Measurements	Occupational	2750	5000
(NCRP Report 86, 1986)	Public	550	1000
State Codes			
New Jersey (NJAC 7:28-42)	Public	2750	5000
Massachusetts (Department of Health 105 CMR 122)	Public	550	1000
New York State[3]	Public	550	1000

NOTES:

1. Reaffirmed in 1997 and published with modification in 1998.
2. Incorporating IEEE Standard C95.1-1991 and IEEE Standard C95.1a-1998.
3. State of New York Department of Health follows NCRP Report 86.

APPENDIX - Analytical Technique

This appendix describes the methodology used to predict the radiofrequency (RF) electromagnetic environment surrounding the proposed AT&T PCS antennas and all co-located wireless communications antennas. As a conservative measure, the methodology applies "worst-case" conditions that result in an over-estimate of the RF environment, e.g., the calculations include the effect of field reinforcement from in-phase reflections. Therefore, the predicted values are the theoretical maxima that could occur and not typical values. The actual power density levels have always been found to be smaller than the corresponding predicted levels[4]. The methodology described follows that outlined by the Federal Communications Commission (FCC) in their OST Bulletin No. 65[5].

For each transmitting antenna, the maximum RF power density at 6 ft above grade was estimated by performing a series of power density predictions for depression angles below the horizon from 5° to 90°. This was done using the vertical gain pattern of each antenna provided by the antenna manufacturer and by using the following equation:

$$S = \left(\frac{N \times P_N \times G_\theta \times 1.64}{4\pi R^2} \right)$$

and

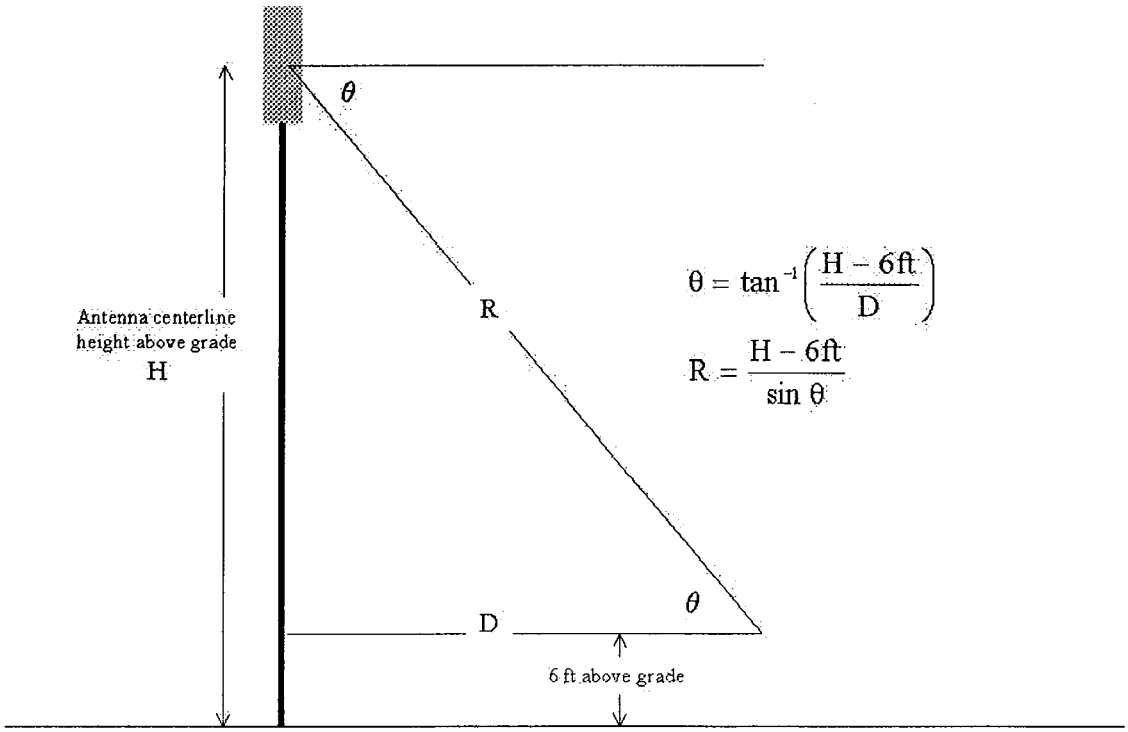
$$S_{max} = 4 \times S$$

where:

S	= plane wave equivalent power density
S_{max}	= factor of 4 assumes a 100% ground reflection (resulting in a doubling of the field strength and a four-fold increase in power density)
N	= maximum number of transmitters (channels)
P_N	= actual power per channel input to the antenna
G_θ	= far-field gain (numeric) of the antenna relative to a half-wave dipole in the direction of point of interest
R	= distance (radial or slant) from the antenna center to point of interest
1.64	= gain of a half-wave dipole (2.15 dB) over an isotropic radiator

4. Petersen, R.C., and Testagrossa, P.A., Radiofrequency Fields Associated with Cellular-Radio Cell-Site Antennas, *Bioelectromagnetics, Vol. 13, No. 6 (1992).*

5. Federal Communications Commission Office of Engineering & Technology, *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Radiation,* OET Bulletin No. 65, Edition 97-01 (August 1997).



Based on the technical specifications for the site outlined in Table 1 of this report, the maximum RF power density (S_{max}) associated with the AT&T PCS antennas occurs at a depression angle of 30° below the horizon and is calculated as follows:

$$R = (H\text{-}6)/\sin\theta = (160\text{-}6)/\sin(30°) = 308 \text{ ft}$$

$G_{30°} = -2.2$ dBd (from antenna elevation gain pattern)

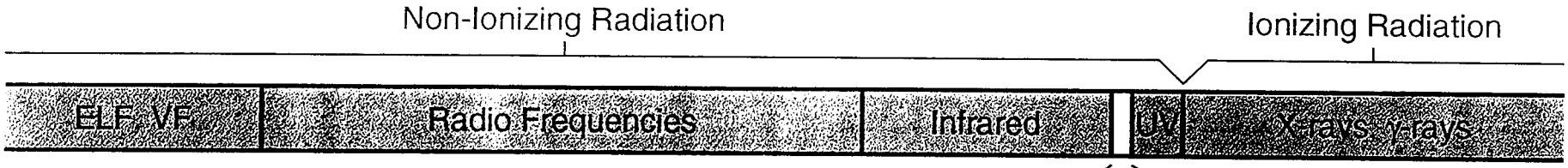
$$P_N = ERP/G_{max} = \frac{100}{10^{(14dBd/10)}} = 4 \text{ watts per channel}$$

$$S_{max} = 4 \times \frac{N \times P_N \times 10^{(G_\theta/10)} \times 1.64}{4\pi R^2}$$

$$= 4 \times \frac{8ch \times 4W/ch \times 10^{(-2.2dBd/10)} \times 1.64}{4 \times 3.14 \times (308ft \times 12 \times 2.54)^2}$$

$$S_{max} = 1.1 \times 10^{-7} \text{ W/cm}^2 = 0.00011 \text{ mW/cm}^2$$

ELECTROMAGNETIC SPECTRUM



AM Radio: *535 - 1605 kHz*
CB Radio: *27 MHz*
Cordless Phones: *49 MHz*
TV Ch 2-6: *54 - 88 MHz*
FM Radio: *88 - 108 MHz*
Marine Radio: *160 MHz*
TV Ch 7-13: *174 - 216 MHz*
TV UHF Ch 14-69: *470 - 800 MHz*
Cellular Radio, Specialized Mobile Radio, Paging: *806 - 946 MHz*
Antitheft devices: *10-20 kHz and/or 915 MHz*
Microwave oven: *915 and 2450 MHz*
Personal Communication Services: *1800 - 2200 MHz*
Intrusion alarms / door openers: *10.5 GHz*
Microwave radio: *1 - 40 GHz*
Satellite Communications: *100 MHz - 275 GHz*