STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

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

November 16, 2000

Linda Grant
Cuddy & Feder & Worby LLP
90 Maple Avenue
White Plains, New York 10601-5196

RE: **EM-AT&T-097-001106** - AT&T Wireless PCS, LLC, d/b/a AT&T Wireless Services, Inc. notice of intent to modify an existing telecommunications facility located at 20 Barnabas Road, Newtown, Connecticut.

Dear Ms. Grant:

At a public meeting held on November 14, 2000, the Connecticut Siting Council (Council) acknowledged your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies, with the condition that erosion and sedimentation controls are implemented, as required by the Connecticut Guidelines for Soil Erosion and Sediment Control.

The proposed modifications are to be implemented as specified here and in your notice dated November 3, 2000. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also 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.

This decision is under the exclusive jurisdiction of the Council. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of 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.

Thank you for your attention and cooperation.

Very truly yours,

Mortimer A. Gelston
Chairman

MAG/RKE/laf

c: Honorable Herbert C. Rosenthal, First Selectman, Town of Newtown
Dorian E. Hill, Northeast Utilities
J. Brendan Sharkey, VoiceStream Wireless Corporation
Ronald C. Clark, Nextel Communications
Julie M. Cashin, Esq., Hurwitz & Sagarin LLC

Northeast Utilities System

107 Selden Street, Berlin, CT 06037

Northeast Utilities Service Company
P.O. Box 270
Hartford, CT 06141-0270
(860) 665-5000
www.nu.com

November 13, 2000

Mr. Joel M. Rinebold
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, Connecticut 06051

re: AT&T Wireless Services
Notice of Exempt Modification
20 Barnabas Rd, Newtown, CT

Dear Mr.Rinebold:

Per your recent telephone message, NU is aware of the Structural Analysis Report submitted by AT&T in which the sway slightly exceeds NU standards; NU utilizes a very conservative tower design that requires 85 mph wind loading and simultaneous ice, one-half inch thick. This exceeds the EIA standard required for the geographic area of NU's Newtown tower. The degradation of NU's microwave signal, due to the new sway, is within our design tolerance and is acceptable to NU.

Please feel free to call with any other questions you may have.

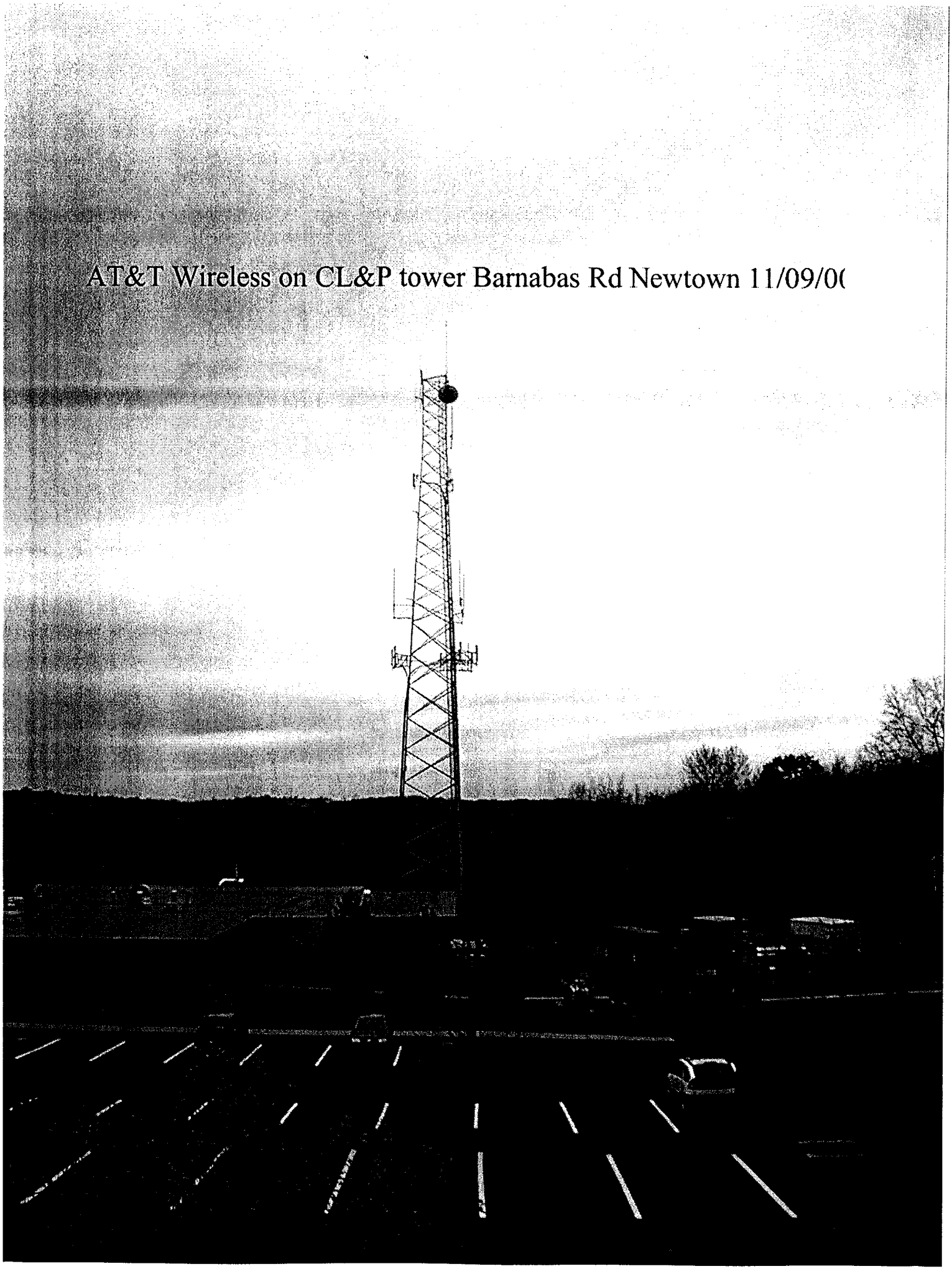
Very truly yours,

Linda M. Carroll

Linda M. Carroll
Real Estate Analyst

cc: A. Dudek
S. Giuliano
W. Hamel

AT&T Wireless on CL&P tower Barnabas Rd Newtown 11/09/0(



STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

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

November 7, 2000

Honorable Herbert C. Rosenthal
First Selectman
Town of Newtown
Town Hall
45 Main Street
Newtown, CT 06470

RE: **EM-AT&T-097-001106** - AT&T Wireless PCS, LLC, d/b/a AT&T Wireless Services, Inc. notice of intent to modify an existing telecommunications facility located at 20 Barnabas Road, Newtown, Connecticut.

Dear Mr. Rosenthal:

The Connecticut Siting Council (Council) received this request to modify an existing telecommunications facility, pursuant to Regulations of Connecticut State Agencies Section 16-50j-72.

The Council will consider this item at the next meeting scheduled for November 14, 2000, at 11:00 a..m. in Hearing Room One, Ten Franklin Square, New Britain, Connecticut.

Please call me or inform the Council if you have any questions or comments regarding this proposal.

Thank you for your cooperation and consideration.

Very truly yours,

Joel M. Rinebold
Executive Director

JMR/RKE/laf

Enclosure: Notice of Intent

CUDDY & FEDER & WORBY LLP

90 MAPLE AVENUE
WHITE PLAINS, NEW YORK 10601-5196

(914) 761-1300
TELECOPIER (914) 761-5372/6405
www.cfwlaw.com

New York City Office
230 PARK AVENUE
NEW YORK, NEW YORK 10169
(212) 949-6280
TELECOPIER (212) 949-6346

Connecticut Offices
733 SUMMER STREET
STAMFORD, CONNECTICUT 06901
(203) 348-4780

4 BERKELEY STREET
NORWALK, CONNECTICUT 06850
(203) 853-8001
TELECOPIER (203) 831-8250

NEIL J. ALEXANDER (also CT)
THOMAS R. BEIRNE (also D.C.)
JOSEPH P. CARLUCCI
KENNETH J. DUBROFF
ROBERT FEDER
CHRISTOPHER B. FISHER (also CT)
ANTHONY B. GIOFFRE III (also CT)
KAREN G. GRANIK
JOSHUA J. GRAUER
WAYNE E. HELLER (also CT)
KENNETH F. JURIST
MICHAEL L. KATZ (also NJ)
JOSHUA E. KIMERLING (also CT)
DANIEL F. LEARY (also CT)
BARRY E. LONG

CUDDY & FEDER
1971-1995

WILLIAM S. NULL
DAWN M. PORTNEY
ELISABETH N. RADOW
NEIL T. RIMSKY
RUTH E. ROTH
MIGUEL A. TORRELLAS (also NJ)
CHAUNCEY L. WALKER (also CA)
ROBERT L. WOLFE
DAVID E. WORBY

Of Counsel
LAUREEN J. PETERSON-COLASACCO (also CT)
MICHAEL R. EDELMAN
ANDREW A. GLICKSON (also CT)
DEBORAH S. LEWIS (also CT)
ROBERT L. OSAR (also TX)
MARYANN M. PALERMO
ROBERT C. SCHNEIDER
LOUIS R. TAFFERA

November 3, 2000

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

Re: AT&T Wireless Services
Notice of Exempt Modification
20 Barnabas Road, Newtown, Connecticut

Dear Mr. Rinebold:

On behalf of AT&T Wireless PCS, LLC, d/b/a AT&T Wireless Services, Inc., we respectfully enclose an original and twenty copies of its notice of exempt modification with respect to the above mentioned facility, together with a check for $500.00, the filing fee. We would appreciate it if this matter were placed on the next available agenda for acknowledgment by the Council. Should the Council or staff have any questions regarding this matter, please do not hesitate to contact us.

Very Truly Yours,

Linda Grant

Linda Grant

cc: Christopher B. Fisher, Esq.
Mr. Salvatore Giuliano, Northeast Utilities
Ms. Michael Austin, Pinnacle Site Development

Mr. Michael Murphy, AT&T Wireless
First Selectman Town of Newtown

NOTICE OF INTENT TO MODIFY A NORTHEAST UTILITIES OWNED AND OPERATED FACILITY AT 20 BARNABAS ROAD, NEWTOWN, CONNECTICUT

Pursuant to the Public Utility Environmental Standards Act, Connecticut General Statutes §§ 16-50aa ("PUESA"), and Sections 16-50j-72(b)(2) and 16-50j-73 of the Regulations of Connecticut State Agencies adopted pursuant to the PUESA, AT&T Wireless PCS, LLC, by and through its agent AT&T Wireless PCS, Inc. ("AT&T Wireless") hereby notifies the Connecticut Siting Council of its intent to modify an existing facility located at 20 Barnabas Road, Newtown, Connecticut (the "Barnabas Road Facility") which is owned and operated by Northeast Utilities Service Company ("NU"). This notice is being provided by AT&T Wireless pursuant to a letter of authorization from NU, a copy of which is annexed hereto as Exhibit A.

The Barnabas Road Facility

The Barnabas Road Facility consists of an approximately one hundred eighty (180) foot tall steel lattice telecommunications tower (the "Tower") and equipment buildings and pads which are currently being used by Omnipoint Communications ("Omnipoint"), Nextel Communications ("Nextel"), Sprint PCS ("Sprint"), Northeast Utilities and others for wireless communications purposes. A chain link fence surrounds the Tower and equipment shelters. The property owned by NU is the site of a maintenance yard. The current adjacent land uses are unchanged since the tower was constructed and include rural residential lots and Interstate 84.

AT&T Wireless' Facility

As shown on the enclosed plans prepared by Tectonic Engineering Consultants, PC, including a site plan and tower elevation of the Barnabas Road Facility, AT&T Wireless proposes shared use of the Facility by placing antennas on the Tower and an equipment shelter for its equipment needed to provide personal communications services ("PCS") within an expansion of the existing fenced area. AT&T Wireless will install up to twelve (12) panel antennas at approximately the 136 foot level of the Tower. AT&T has confirmed that the tower is structurally capable of supporting the addition of AT&T Wireless' antennas as set forth in a letter from Tectonic Engineering annexed hereto as Exhibit B.

AT&T Wireless' Facility Constitutes An Exempt Modification

The proposed addition of AT&T Wireless' antennas and equipment to the Barnabas Road 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. Addition of AT&T Wireless' 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

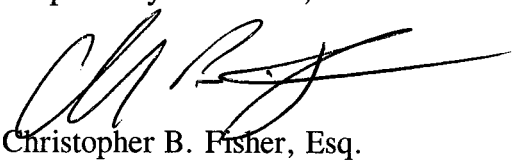
EM-AT&T-097-001106

more at the Tower site's boundary. As set forth in an Emissions Report prepared by Bell Laboratories annexed hereto as Exhibit C, the total radio frequency electromagnetic radiation power density at the Tower site's boundary will not be increased 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. For all the foregoing reasons, addition of AT&T Wireless' facility to the Tower constitutes an exempt modification which will not have a substantially adverse environmental effect.

Conclusion

Accordingly, AT&T Wireless requests that the Connecticut Siting Council acknowledge that its proposed modification to the Barnabas Road Facility meets the Council's exemption criteria.

Respectfully Submitted,



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

AT&T WIRELESS PCS, LLC.

UNMANNED WIRELESS COMMUNICATION EQUIPMENT SITE
20 BARNABAS ROAD
NEWTOWN, CONNECTICUT
"SITE NO. CT-178"

PROJECT INDEX	
SITE NUMBER:	CT-178
SITE ADDRESS:	20 BARNABAS ROAD NEWTOWN, CT
OWNER:	NORTHEAST UTILITIES P.O. BOX 270 HARTFORD, CT 06140-0270
APPLICANT:	AT&T WIRELESS PCS, LLC. 149 WATER STREET NORWALK, CT 06854
TAX MAP:	MAP 29 LOT 10
LATITUDE (NAD 27):	41° 25' 36" N
LONGITUDE (NAD 27):	73° 20' 41" W

RELEASED BY: J.B.K.

REV		
REV 1	FOR NU REVIEW	5/18/00

0 1 2

ORIGINAL SIZE IN INCHES

Client

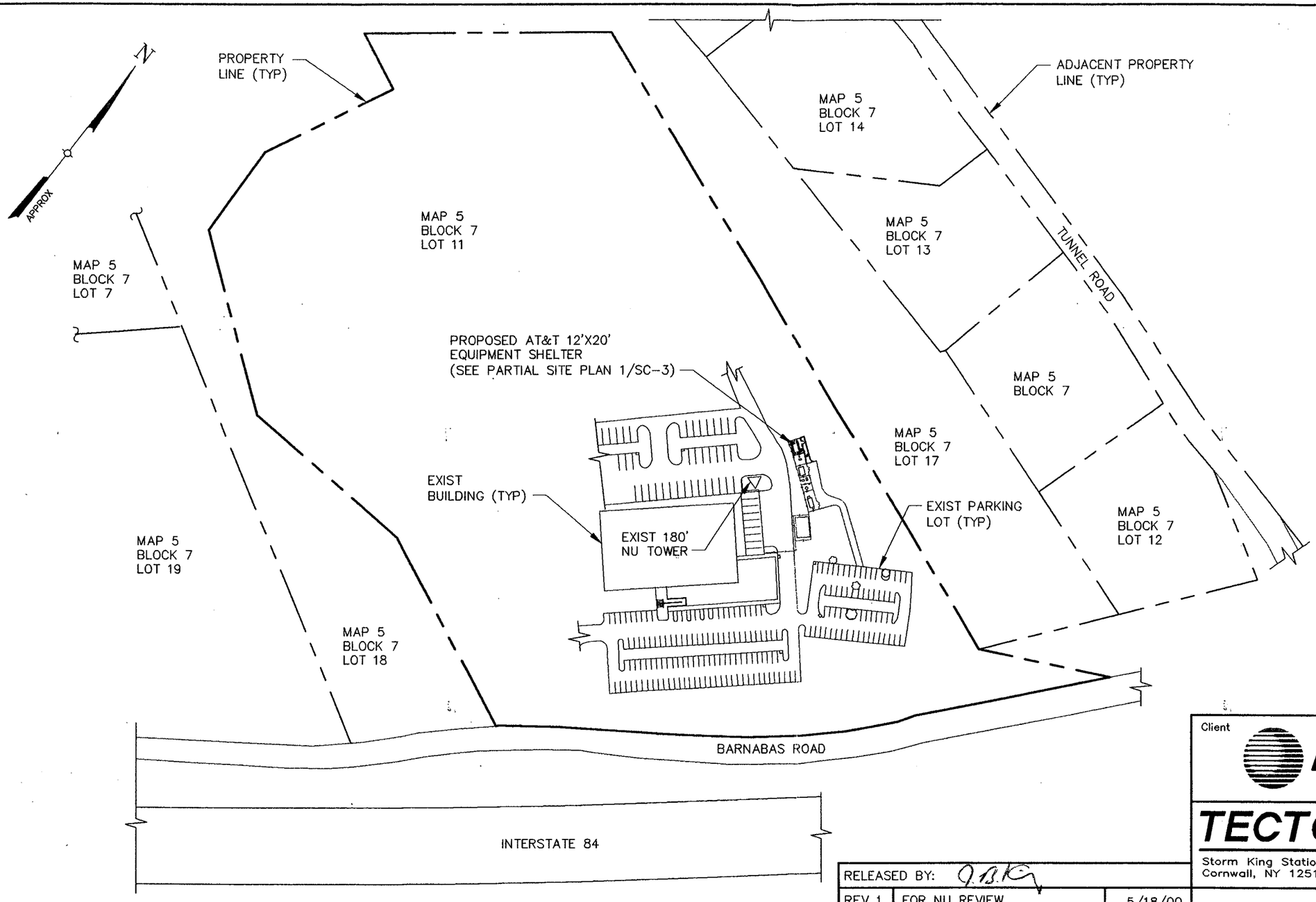
AT&T WIRELESS PCS, LLC.
149 Water Street
Norwalk, CT 06854

TECTONIC ENGINEERING CONSULTANTS P.C.
Storm King Station, 2570 Route 9W
Cornwall, NY 12518
(914) 534-3450

TITLE SHEET

HAWLEYVILLE (CT-178)
EXISTING LATTICE TOWER
20 BARNABAS ROAD
NEWTOWN, CT

Date	Work Order	Drawing No.	Rev
4/27/00	2323.178	SC-1	1
Scale: AS NOTED			



1 / SC-2 SITE PLAN

SCALE: 1" = 200'

RELEASED BY: J.B.K.

REV		
REV 1	FOR NU REVIEW	5/18/00

0 1 2

ORIGINAL SIZE IN INCHES

Client

AT&T WIRELESS PCS, LLC.
149 Water Street
Norwalk, CT 06854

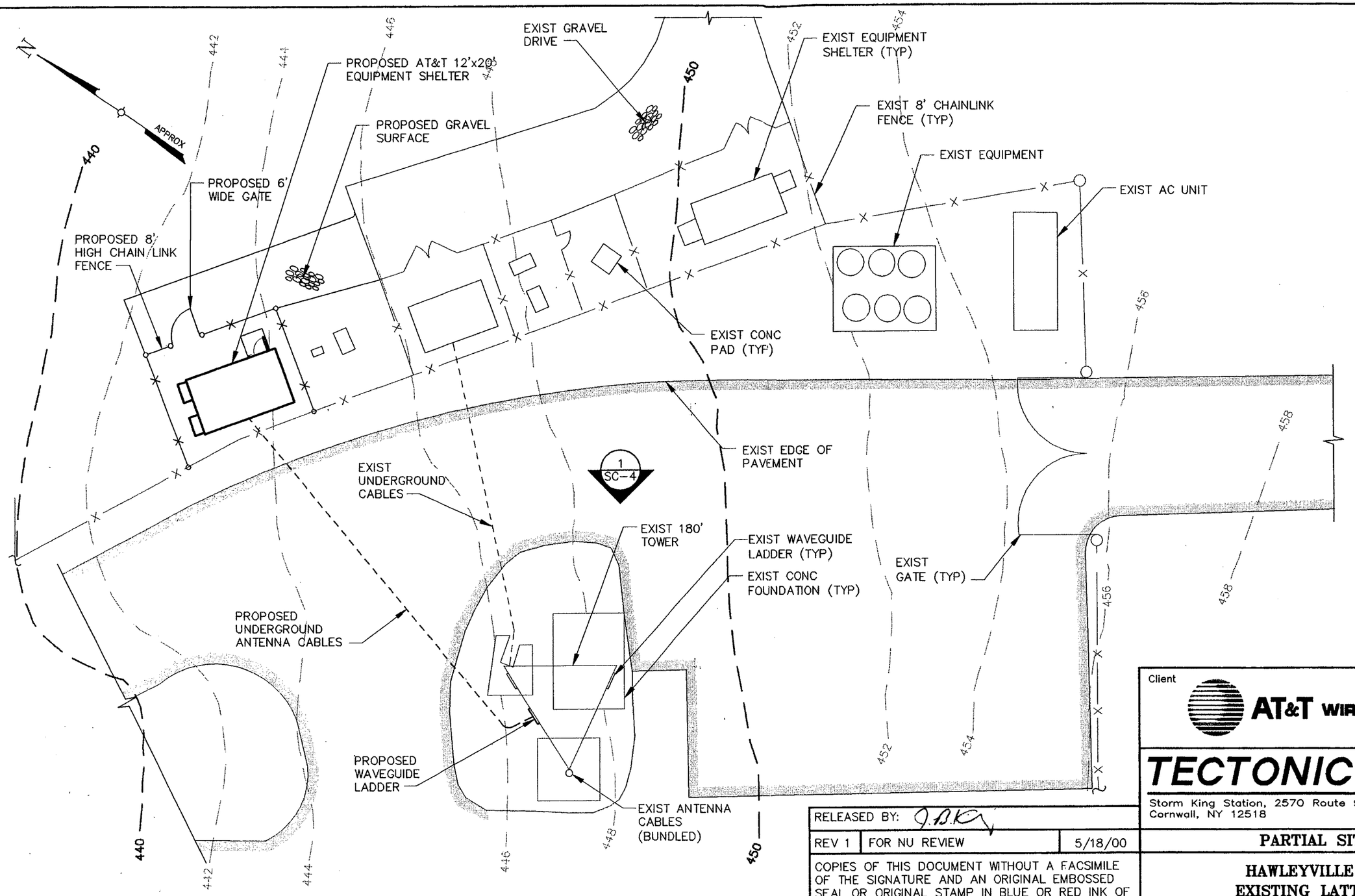
TECTONIC *ENGINEERING CONSULTANTS P.C.*
Storm King Station, 2570 Route 9W
Cornwall, NY 12518
(914) 534-3450

SITE PLAN

HAWLEYVILLE (CT-178)
EXISTING LATTICE TOWER
20 BARNABAS ROAD
NEWTOWN, CT

Date	Work Order	Drawing No.	Rev
4/27/00	2323.178	SC-2	1

Scale: AS NOTED



1 SC-3 PARTIAL SITE PLAN

SCALE: 1" = 20'

RELEASED BY: J.B.K.

REV		
1	FOR NU REVIEW	5/18/00

0 1 2

ORIGINAL SIZE IN INCHES

Client

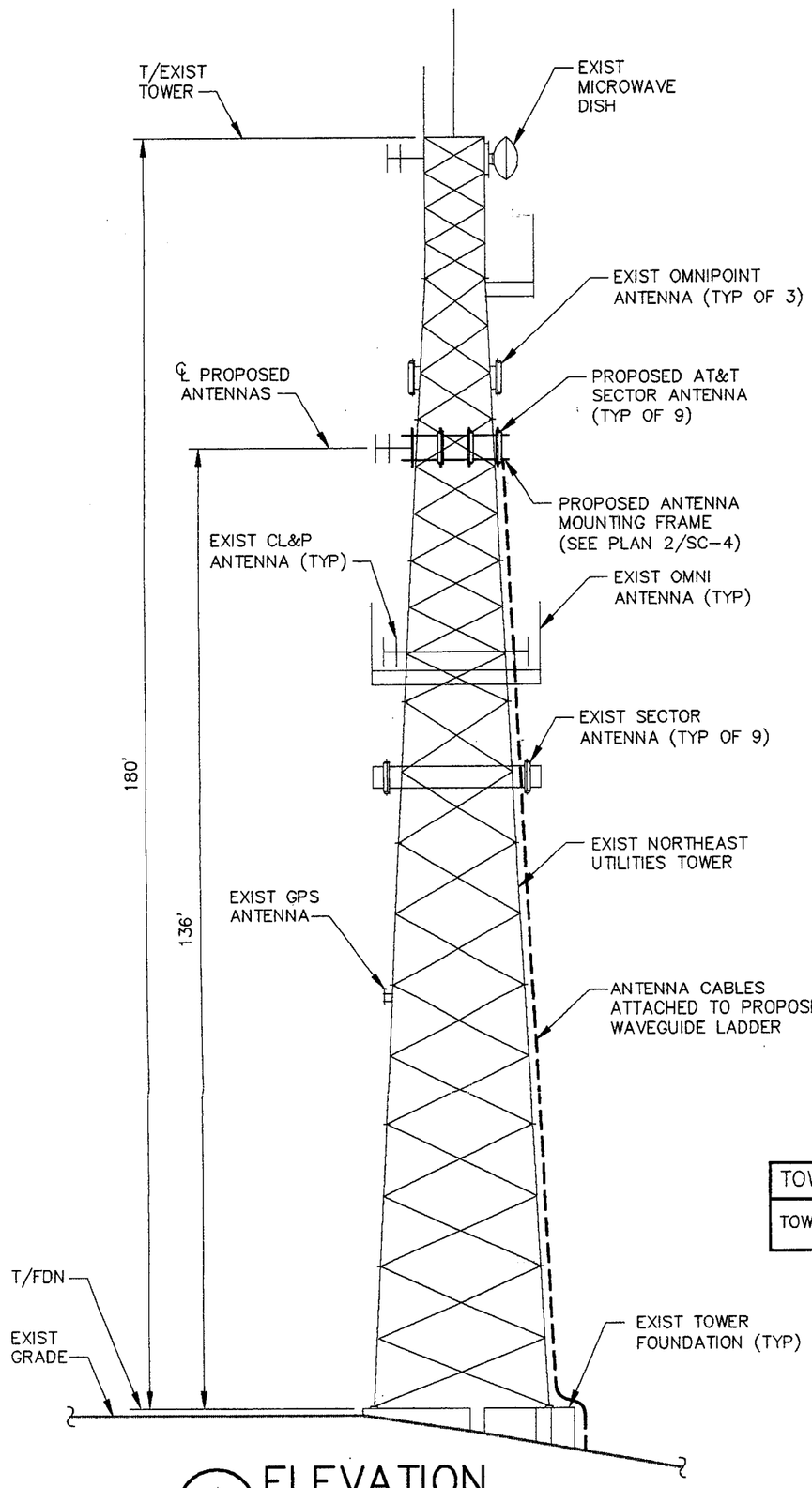
AT&T WIRELESS PCS, LLC.
149 Water Street
Norwalk, CT 06854

TECTONIC ENGINEERING CONSULTANTS P.C.
Storm King Station, 2570 Route 9W
Cornwall, NY 12518
(914) 534-3450

PARTIAL SITE PLAN

HAWLEYVILLE (CT-178)
EXISTING LATTICE TOWER
20 BARNABAS ROAD
NEWTOWN, CT

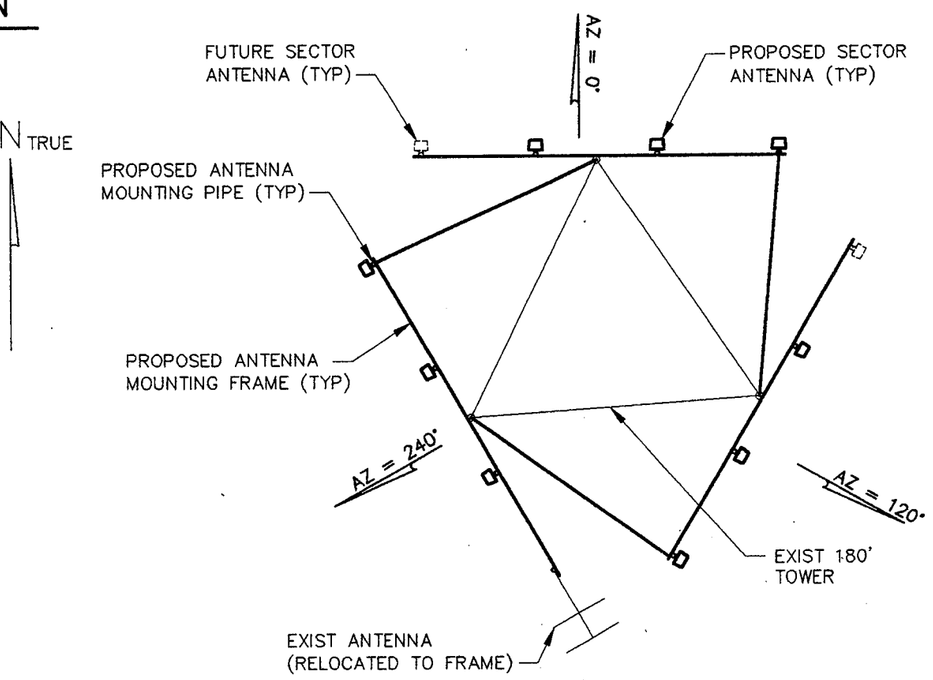
Date	Work Order	Drawing No.	Rev
4/27/00	2323.178	SC-3	1
Scale: AS NOTED			



1 SC-4 ELEVATION

SCALE: 1" = 20'

TOWER IDENTIFICATION
TOWER ID#: 1340



2 SC-4 ANTENNA MOUNTING PLAN

SCALE: 1" = 5'

Client

AT&T WIRELESS PCS, LLC.
149 Water Street
Norwalk, CT 06854

TECTONIC *ENGINEERING CONSULTANTS P.C.*
Storm King Station, 2570 Route 9W
Cornwall, NY 12518
(914) 534-3450

ELEVATION & ANTENNA MTG PLAN

HAWLEYVILLE (CT-178)
EXISTING LATTICE TOWER
20 BARNABAS ROAD
NEWTOWN, CT

Date	Work Order	Drawing No.	Rev
4/27/00	2323.178	SC-4	1
Scale: AS NOTED			

REV		
1	FOR NU REVIEW	5/18/00

RELEASED BY: Q.M.K.

0 1 2

ORIGINAL SIZE IN INCHES

Northeast
Utilities System

107 Selden Street, Berlin, CT 06037

Northeast Utilities Service Company
P.O. Box 270
Hartford, CT 06141-0270
(860) 665-5000
www.nu.com

July 27, 2000

Mr. Daniel Gerber
Construction Manager
AT&T Wireless Services
149 Water Street, Suite 2C-2D
Norwalk, CT 06854

Re: Site Permitting Authorization
Newtown Telecommunications Site

Dear Mr. Gerber:

Authorization is hereby given to AT&T Wireless Services (AT&T), its employees and its duly authorized agents and independent contractors (hereinafter collectively referred to as "AT&T"), to apply for any and all local municipal, state and federal licenses, permits and approvals, including but not limited to Connecticut Siting Council, building permits, zoning variances, zoning special exceptions, site plan and subdivision approvals, driveway, wetlands and terrain alteration permits, which are or may be necessary or required for AT&T to construct, operate and maintain a wireless communications system (PCS System), and/or antenna site on the following property owned by The Connecticut Light & Power Company (CL&P):

CL&P Telecommunications Tower
Barnabas Road
Newtown, Connecticut

The foregoing authorization is given subject to the following conditions:

1. This authorization shall be nonexclusive. Nothing herein shall prevent or restrict CL&P from authorizing any other person or entity to apply for any similar licenses, permits or approvals to construct, operate and maintain any other communication system or facility of any type on the property at any time.

2. This authorization shall not obligate CL&P to pay for or reimburse any costs or expenses or to provide any assistance of any kind in connection with any applications, or bind or obligate CL&P to agree or be responsible for any on-site or off-site improvements, development restrictions, impact fees or assessments, capital improvement charges, bonds or other security, or any other fee, assessment, charge or expense imposed or required as a condition of any license, permit or approval. AT&T shall be solely and fully responsible for all fees, charges costs and expenses of any kind in connection with any applications. CL&P agrees to reasonably cooperate with AT&T in signing such applications or other similar documents as may be required in order for AT&T to apply for any license, permit or approval.

3. This authorization shall not be deemed or construed to grant or transfer to AT&T any interest in the property, whatsoever, and shall not in any respect obligate or require CL&P to sell, lease or license the Property to AT&T or otherwise allow AT&T to use or occupy the property for any purpose, regardless of whether any licenses, permits and approvals applied for by AT&T for the property are granted. AT&T understands and acknowledges that any and all applications filed by AT&T for the property at AT&T's sole risk and without any enforceable expectation that the property will be made available for AT&T's use.

4. AT&T shall be required to supply to CL&P, free of charge and contemporaneous with AT&T's filing of same, a complete copy of any and all applications, plans, reports and other public filings made by AT&T with any local, municipal, state or federal governmental or regulatory officer, agency board, bureau, commission or other person or body for any licenses, permits or approvals for the property, and to keep CL&P fully informed on a regular basis of the status of AT&T's applications.

5. This authorization shall automatically expire six (6) months after the date of this letter, unless extended in writing by mutual agreement of CL&P and AT&T.

Very truly yours,

Salvatore Giuliano, Manager
Real Estate and Land Planning

AGREED TO on behalf of AT&T Wireless Services

Duly Authorized

Northeast Utilities System

107 Selden Street, Berlin, CT 06037

Northeast Utilities Service Company
P.O. Box 270
Hartford, CT 06141-0270
(860) 665-5000
www.nu.com

November 13, 2000

Mr. Joel M. Rinebold
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, Connecticut 06051

re: AT&T Wireless Services
Notice of Exempt Modification
20 Barnabas Rd, Newtown, CT

Dear Mr.Rinebold:

Per your recent telephone message, NU is aware of the Structural Analysis Report submitted by AT&T in which the sway slightly exceeds NU standards; NU utilizes a very conservative tower design that requires 85 mph wind loading and simultaneous ice, one-half inch thick. This exceeds the EIA standard required for the geographic area of NU's Newtown tower. The degradation of NU's microwave signal, due to the new sway, is within our design tolerance and is acceptable to NU.

Please feel free to call with any other questions you may have.

Very truly yours,

Linda M. Carroll

Linda M. Carroll
Real Estate Analyst

cc: A. Dudek
S. Giuliano
W. Hamel

TECTONIC *ENGINEERING CONSULTANTS P.C.*

OFFICES:
Albany, NY
Cornwall, NY
Mt. Vernon, NY
Cincinnati, OH
Northborough, MA
Richmond, VA

P. O. Box 37, 70 Pleasant Hill Road
Mountainville, New York 10953

(800) 829-6531 FAX: (914) 534-5999
www.tectonicengineering.com

Fred O. Cunliffe, Siting Analyst II
State of Connecticut
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

November 2, 2000

RE: W.O. 2323.178
AT&T WIRELESS PCS SITE NO. CT-178, HAWLEYVILLE
EXISTING 180' SELF-SUPPORTING TOWER
20 BARNABAS ROAD
NEWTOWN, CT
STRUCTURAL CAPACITY

Dear Mr. Cunliffe:

H. E. Bergeron Engineers, P.A., under contract to Tectonic Engineering Consultants, PC has performed a structural analysis of the above referenced communications tower. The analysis was performed in accordance with the national standard ANSI/TIA/EIA-222-F-1996 "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures", as well as guidelines established by the owner, Northeast Utilities. The wind loads used exceed the requirements of the 1999 Connecticut supplement to the BOCA National Building Code.

The results of this analysis indicate that the existing tower has sufficient capacity to support the antenna installation proposed by AT&T Wireless PCS, as shown on our drawings SC-1 through SC-4 (revision 1, dated 5/18/00), in accordance with applicable codes. The tower sway under the proposed loading slightly exceeds the NU guidelines, but this is not a structural deficiency. No modifications to the existing structure are necessary.

The details of the analysis are presented in the Structural Analysis Report dated 5/15/00. Please contact me if you require any further information.

Sincerely,
TECTONIC ENGINEERING CONSULTANTS P.C.

STATE OF CONNECTICUT JEFFREY B. KIRBY No. 21291 LICENSED PROFESSIONAL ENGINEER

Jeffrey B. Kirby, P.E.
Chief Structural Engineer

cc: M. Austin
L. Grant / CFW, J. Hiller / Tectonic

file jk142/AT&T/Conn/178StrLtr

An Analysis of the Radiofrequency Environment in the Vicinity of a Proposed Personal Communications Services Base Station Site CT-178.1.1: CL&P Communications Tower Barnabas Road, Newtown, Connecticut

Prepared by
the

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

Prepared for

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

October 25, 2000

TABLE OF CONTENTS

Summary **3**

1. Introduction **4**

2. Technical Data **4**

3. Environmental Levels of RF Energy **4**

3.1 PCS 4
3.2 Existing RF Background 5
3.2.1 Broadband Measurements 5
3.2.2 Narrowband Measurements 7

4. Comparison of the Environmental Levels with RF Safety Criteria **7**

5. Discussion of Safety Criteria **7**

6. For Further Information **9**

7. Conclusion **9**

8. References **11**

An Analysis of the Radiofrequency Environment in the Vicinity of a Proposed Personal Communications Services Base Station Site CT-178.1.1: CL&P Communications Tower Barnabas Road, Newtown, Connecticut

Summary

This report is an analysis of the radiofrequency (RF) environment surrounding the radio communication antennas located on the CL&P Communications Tower in Newtown, Connecticut. Included in this report are: 1) the results of an analysis of the RF environment produced by the proposed installation of AT&T Wireless Services (AT&T) personal communications services (PCS) base-station antennas; 2) the results of RF field-strength measurements which document the existing background associated with the antennas currently located on the tower; 3) a comparison of the combined results of 1) and 2) with the appropriate safety guidelines.

The engineering data provided by AT&T, together with well-established analytical techniques, were used to calculate the RF fields associated with the PCS 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. In addition, broadband and narrowband electric field-strength measurements were made over an extended period of time to determine the *existing* background RF environment. The broadband data were averaged over contiguous 30-minute intervals for comparison with Federal Communication Commission (FCC) guidelines.

These analyses, which include analytical and measurement results, indicate that the maximal level of RF energy to which the public may be exposed will be well below all applicable health and safety limits. Specifically, in all normally accessible areas surrounding this facility, the maximal level of RF energy associated with *simultaneous and continuous operation of all proposed and existing transmitters at the site and in the vicinity of the site* will be less than 0.2% of the safety criteria adopted by the FCC as mandated by the Telecommunications Act of 1996. The Telecommunications Act of 1996 is the applicable Federal law with respect to consideration of environmental effects of RF emissions in the siting of personal wireless facilities. The maximum level of RF energy will also be less than 0.2% exposure limits of ANSI, IEEE, NCRP and the limits of all states that regulate RF exposure.

1. Introduction

This report was prepared in response to a request from AT&T Wireless Services (AT&T) for an analysis of the radiofrequency (RF) environment in the vicinity of a proposed personal communications services (PCS) facility, and an opinion regarding the concern for public health associated with long-term exposure in this environment. Included in this report are: 1) the results of an analysis of the RF environment that will be produced by the proposed AT&T PCS antennas; 2) the results of background RF measurements associated with all existing RF sources; 3) a comparison of the combined results with the appropriate safety guidelines.

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. With respect to personal communication services, e.g., PCS, ESMR and cellular radio, 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 this facility complies with the Federal Communications Commission (FCC) guidelines as required by the Telecommunications Act of 1996.

2. Technical Data

The proposed PCS antennas are to be co-located with existing services mounted on the CL&P Communications Tower located off Barnabas Road in Newtown, CT. The PCS antennas transmit at frequencies between 1930 and 1990 million hertz (MHz).

The actual RF power propagated from a PCS 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 *simultaneously and continuously*). This is an extremely low power system when compared with other familiar radio systems, such as AM, FM, and television broadcast, which operate upwards of 50,000 watts. The attached chart, which depicts the electromagnetic spectrum, lists familiar uses of RF energy. Table 1 lists engineering specifications for the proposed PCS system.

3. Environmental Levels of RF Energy

3.1 PCS

The antennas used for PCS (and most personal wireless services) 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 their OET Bulletin No. 65[1] and is explained in detail in the Appendix. For the case at hand, the maximal potential exposure levels associated with *simultaneous and continuous operation* of

1. *OET Bulletin 65*, Edition 97-01, August 1997. Federal Communications Commission, Office of Engineering and Technology, Washington, DC

AT&T's 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 density associated with the PCS antennas, at any point in a horizontal plane 6 ft above grade will be less than 0.000210 thousands of a watt per square centimeter (0.000210 mW/cm^2) and will be less than 0.000247 mW/cm^2 at any point in a corresponding plane 16 ft above grade. The latter would be representative of the maximum power density immediately outside the upper floor of nearby private homes (assuming level terrain). These levels are also shown in Table 2 expressed 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 above 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. Moreover, 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) [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.

3.2 Existing RF Background

RF field-strength measurements were made on September 28, 2000, in the vicinity of the CL&P Communications Tower (see Figure 1). The purpose of these measurements was to document the existing RF background to ensure that the radio signals emanating from AT&T's antennas combined with the existing RF background will not exceed the applicable safety criteria.

Both narrowband and broadband electric field-strength measurements were made. Narrowband measurements provide frequency and field-strength information for each signal measured. Broadband measurements provide both temporal peak and average values of the *total* RF environment, i.e., the combined fields from all measurable sources, but do not provide frequency information. The results of the broadband measurements were averaged over contiguous 30 minute intervals in accordance with the FCC safety criteria [2].

The measurement techniques and instrumentation used in performing these measurements conform with those found in reference documents published by scientific committees with expertise in evaluating human exposure to electromagnetic fields[4,5,6]. The overall uncertainty associated with the measurements (which results from instrument limitations and field interactions between the instrument and operator), in terms of RF power density, is ±2dB (+58%, -37%)[3]. *In this study a conservative approach was taken and all measurement results were multiplied by a factor of 1.58 (58%.).*

3.2.1 Broadband Measurements

Instrumentation

Holaday Industries (HI) broadband RF survey systems were used to simultaneously measure the combined power density of all measurable signals between 0.5 and 1500 MHz: the HI systems are comprised of a readout and a HI-HSE high sensitivity isotropic electric field probe. Services that transmit within the bandwidth of the HI probe include commercial AM and FM radio broadcast, VHF and UHF television, emergency services radio (e.g., police, ambulance and fire), cellular radio, amateur radio and a myriad of other services. The sensitivity of the measurement systems is such that signal intensities greater than approximately 0.000026 mW/cm^2 can be measured reliably.

To facilitate managing the data, a HI Model 3320 Datalogger was connected to each readout. The datalogger is a microprocessor-based device with programmable functions that include sampling rate, recording interval and data set parameters. The sampling rate is number of times per second the device samples the output of the readout (one to four times per second); the recording interval is the period at which the device stores a set of data; the data set parameters are the minimum, maximum and average of the all the samples taken within the recording interval (a set can be any combination of the min, max and average values). The recording interval and data set parameters are selected based on the total recording time required and the memory limitations of the device. At the end of every interval, the maximum, minimum and average values of the samples taken during the previous interval are calculated and stored. For example, measurements made over a 2 hour duration using a one-minute recording interval (120 minutes, 28,800 samples) would yield 120 maxima, 120 minima and 120 average values—one set of values for each one-minute interval. The dataloggers, for this survey, were programmed to save data at 1-minute intervals. This period setting provides sufficient data to identify the nature of the signals measured, i.e., whether they were intermittent or continuous.

Measurements

Measurements were made at four locations in the vicinity of the CL&P tower. The locations were selected based on the area topography and accessibility to the public: location #1 was the upper level of the CL&P parking lot (grade level is approximately 50 ft higher than tower base), 340 ft SE of the tower – narrowband test antenna was also setup at this location; location #2 was in the CL&P maintenance yard, approximately 300 ft north of the tower (grade level was lower than tower base); location #3 was in the CL&P maintenance yard, approximately 450 ft west of the tower; location #4 was off Barnabas Road, 460 ft SE of the tower (grade level was approximately 100 ft higher than tower base). In each case the test antenna (probe) was set at a height of 6 ft above grade level.

The dataloggers were programmed to save data at 1-minute periods, with each instrument collecting between 13,000 and 40,000 samples over the sampling duration. The one-minute period provides sufficient data to identify the nature of the signals measured, i.e., whether they were intermittent or continuous. The broadband data collected for all locations are shown graphically in Figure 2 The range of the maximum (*peak*), average and minimum values recorded for each location is summarized in Table 3. The *highest* of the *peak* values was 0.000366 mW/cm^2. The fluctuation in levels over the total recording duration can be seen in Figure 2. This is a typical characteristic of wireless communication operation, i.e., transmissions from these type of services are highly variable, intermittent and difficult to predict.

In accordance with the FCC guidelines for assessing general population (uncontrolled environment) exposure, data was averaged over 30-minute intervals. Rather than averaging the data for the first 30 minutes, the second 30 minutes, etc., a more conservative sliding 30-minute average of *only the peak values* was taken. Thus, the first 30 minute average of *peak* values of instrument #1 (see Figure 2) was the average of all *peak* values logged between 11:58 AM and 12:28 PM, the second was for *peak* values logged between 11:59 AM and 12:29 PM; the third for *peak* values logged between 12:00 and 12:30 PM, etc. The *highest* 30-min average of the *peak* values was 0.000186 mW/cm^2. (All the above values includes an uncertainty factor of 1.58.)

Results

The data for each instrument are displayed in Figure 2 and summarized in Table 3. The *highest* 30-minute sliding average of the *peak* values and the highest *peak* value representative of the existing RF background were 0.000186 mW/cm^2 and 0.000366 mW/cm^2, respectively. (These values include an uncertainty factor of 1.58 times).

3.2.2 Narrowband Measurements

The narrowband measurements were made using the equipment listed in the appendix. The test antenna, located approximately 340 ft SE of the tower (location of HI instrument #1), was mounted on a wooden tripod at a height of approximately 6 ft above grade level and was oriented for maximum response. The maximum-hold feature of the spectrum analyzer was used to ensure that the *peak* values of any intermittent signals were captured. Measurements were made over a range of frequencies extending from 20 to 12,000 MHz and hard copy of the spectrum analyzer display was retained for later analysis.

Printouts of the spectrum analyzer display for various frequency bands are shown in Figures 3 to 8. As indicated above, the data shown in the figures are *peak* values of intermittent signals—not average values. The results of these measurements not only determine the RF levels at the point of measurement, they can be used to identify the contributing sources. The intensities, i.e., power densities, as well as the corresponding percentage of the MPEs are shown in Table 4. The highest level measured was associated with two-way radio (37 MHz) – 0.0000124 mW/cm^2, see Figure 3. (These values also include an uncertainty factor of 1.58 times.)

4. Comparison of the Environmental Levels with RF Safety Criteria

Table 6 shows federal, state and consensus safety criteria (MPEs) for human exposure to RF energy at the frequencies of interest. The appropriate values to consider for comparisons with FCC safety criteria are the maximum calculated levels associated with the proposed PCS antennas (Table 2) and the *highest* of the measured 30-minute averages (Table 3). With respect to FCC MPEs for public exposure, comparisons of the combined weighted values, shown in Table 5, indicate that the maximal level associated with the proposed and existing antennas is at least 500 times below the MPE, i.e., 0.2% of the MPE.

Since the HI instrument measured the combined levels from all sources, the conservative approach used in this report was to compare values with the most restrictive[2] FCC MPE, i.e., 200 $\mu W/cm^2$. The results of these measurements are in agreement with similar measurements made over the past twenty years by us and by others. The RF background has always found to be relatively low except near major transmission facilities such as commercial radio and television broadcast.

While cellular, ESMR and PCS antennas may increase the local background in close proximity to each site, sites separated by several thousand feet contribute little to one anothers' local RF environment. Moreover, as cells are split to increase capacity, the smaller cells will operate at even lower power and the cumulative power density at any point will not change significantly.

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.

---

2. The Holiday instrument does not provide frequency information nor does it weight different frequencies for direct comparison with the FCC, IEEE or NCRP safety criteria. Therefore, the conservative approach is to compare the values in the table and figure with the most restrictive portion of the FCC limits, i.e., 200 $\mu W/cm^2$ for frequencies between 30 and 300 MHz.

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[7]. 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 recommendations for both continuous occupational and public exposure to RF energy at the frequencies of interest are shown in Table 6. (Table 6 also includes 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[8]. Three different limits, ranging from approximately 0.5 to 5 mW/cm^2 at PCS frequencies and from approximately 0.275 to 2.75 mW/cm^2 at cellular and ESMR frequencies, 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[9], recommended adoption of the 1986 NCRP limits[7].

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[10]. (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 essentially identical to the 1982 ANSI RFPGs[11] for occupational exposure and are one-fifth of these values for exposure of the general public (uncontrolled environments). 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)[12] and the National Radiological Protection Board in the United Kingdom[13] 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[14]. 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[3] ensure that their facilities will comply with the 1996 FCC MPE limits outlined in 47 CFR §1.1310[3][4] (which are the same as the 1992 ANSI/IEEE and 1986 NCRP limits at ESMR frequencies). (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 PCS and existing antennas, be assured that the actual exposure levels in the vicinity of the Newtown, 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 RF environment surrounding the radio communication antennas located on the CL&P Communications Tower in Newtown, Connecticut. Included in this report

3. 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 PCS licensees to comply with the 1992 ANSI/IEEE C95.1 limits and all other licensees (since 1987) to comply with the 1982 ANSI C95.1 limits.

4. 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. In the past, although licensees had to comply with the 1982 ANSI C95.1 limits, the FCC categorically excluded land mobile services, including paging, cellular, SMR 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"[15]. The FCC pointed out that there was no evidence of excessive exposure to RF radiation during routine normal operation of these radio services.

are: 1) the results of an analysis of the RF environment produced by the proposed installation of AT&T PCS base-station antennas; 2) the results of RF field-strength measurements which document the existing background associated with the antennas currently located on the tower; 3) a comparison of the combined results of 1) and 2) with the appropriate safety guidelines.

The engineering data provided by AT&T, together with well-established analytical techniques, were used to calculate the RF fields associated with the PCS 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. In addition, broadband and narrowband electric field-strength measurements were made over an extended period of time to determine the *existing* background RF environment. The broadband data were averaged over contiguous 30-minute intervals for comparison with FCC guidelines.

These analyses, which include analytical and measurement results, indicate that the maximal level of RF energy to which the public may be exposed will be well below all applicable health and safety limits. Specifically, in all normally accessible areas surrounding this facility, the maximal level of RF energy associated with *simultaneous and continuous operation of all proposed and existing transmitters at the site and in the vicinity of the site* will be less than 0.2% of the safety criteria adopted by the FCC as mandated by the Telecommunications Act of 1996. The Telecommunications Act of 1996 is the applicable Federal law with respect to consideration of environmental effects of RF emissions in the siting of personal wireless facilities. The maximum level of RF energy will also be less than 0.2% exposure limits of ANSI, IEEE, NCRP and the limits of all states that regulate RF exposure.

Enclosures:

Chart:	Electromagnetic Spectrum
Figure1:	CL&P Communications Tower, Newtown, CT
Figure 2:	Broadband RF measurements
Figures 3 - 8:	Spectrum analyzer printouts of narrowband measurements
Appendix 1:	Analytical Technique
Appendix 2:	Measurement equipment list

8. References

[1] Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (1996).

[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] *A Practical Guide to the Determination of human Exposure to Radiofrequency Fields.* Report No. 119. National Council on Radiation Protection and Measurements, Bethesda, MD (1993).

[5] *IEEE Recommend Practice for the Measurement of Potentially Hazardous Electromagnetic Field–RF and Microwave.* ANSI/IEEE C95.3-1992. Institute of Electrical and Electronics Engineers, Piscataway, NJ. (1991).

[6] *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields.* OET Bulletin 65 Edition 97-01. Federal Communications Commission, Office of Engineering and Technology, Washington, DC (1997).

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

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

[9] 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. (1993)

[10] *ANSI/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. (1992)

[11] 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)

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

[13] *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)

[14] "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)

[15] 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 PCS System
CL&P Communications Tower, Newtown, CT

Site Specifications	AT&T
maximum ERP per channel †	100 watts
actual radiated power per channel	4 watts
actual *total* radiated power per sector	32 watts
number of transmit (Tx) antennas	1 per sector
number of receive (Rx) antennas	2 per sector
number of Tx/Rx antennas (duplexed)	N/A
maximum number of transmitters	8 per sector
number of sectors configured	3
antenna centerline height above grade	136 ft
antenna manufacturer	Allgon
model number	7184.14
gain	16.15 dBi
type	directional
downtilt	2° (electrical)

† *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 PCS Antennas, CL&P Communications Tower, Newtown, CT

	Power Density (mW/cm^2)		% of MPEs*	
Provider	**6 ft AMGL†**	**16 ft AMGL†**	**6 ft AMGL†**	**16 ft AMGL†**
AT&T Wireless Services				
maximum anywhere	< 0.000210	< 0.000247	0.021%	0.025%
at base of structure	< 0.000077	< 0.000090	0.008%	0.009%

* 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. Broadband RF Measurements – Summary of Data Collected, CL&P Communications Tower, Newtown, CT

Measurement Location	Sampling Duration	Samples Collected†	Range of Power Density Levels (mW/cm²)* for Each Sampling Interval Parameter			Power Density Level (mW/cm²)*
			Min	Average	Max (*Peak*)	30-min avg‡
CL&P parking lot, 340 ft SE of tower (see Figure 1)	169 min	40,560	0.000043 §	0.000043 §	0.000043 § to 0.000115	0.000050
CL&P maintenance yard, 300 ft north of tower	79 min	18,960	0.000043 §	0.000043 §	0.000043 § to 0.000160	0.000047
CL&P maintenance yard, 450 ft west of tower	55 min	13,200	0.000043 §	0.000043 § to 0.000056	0.000071 to 0.000143	0.000082
Off Barnabas Rd, 460 ft south of tower	149 min	35,760	0.000043 § to 0.000080	0.000043 § to 0.000208	0.000059 to 0.000366	0.000186

† Dataloggers were programmed for a 1-minute sampling interval which yielded 240 sets of data (Min, Avg, Max) for each interval.
* These values include a measurement uncertainty factor of 1.58.
‡ These values represents the sliding 30-minute average of the *peak* values.
§ This value represents the minimum discernible level of the Holaday instrument and includes uncertainty factor of 1.58.

Table 4. Narrowband Measurements *Peak* Power Density Levels and Percentages of 1996 FCC MPEs* CL&P Communications Tower, Newtown, CT

Service Type (Frequency Band)	Figure #	Power Density (mW/cm²)†	% of FCC MPEs*
Land Mobile (20 - 54 MHz)	3	0.0000124	0.006189
FM Radio (88 – 108 MHz)	4	0.0000001	0.000044
Land Mobile (110 – 174 MHz)	5	0.0000047	0.002355
ESMR (850 - 900 MHz)	6	0.0000097	0.001755
Paging (900 - 950 MHz)	7	0.0000004	0.000063
PCS (1930 – 1990 MHz)	8	0.0000504	0.000504
		Total	**0.01091**

* MPE: The FCC limits for maximum permissible exposure (same as 1986 NCRP limits at the frequencies of interest)
† The values include the measurement uncertainty factor of 1.58.

Table 5. Comparisons of the *Total* RF Environment with the 1996 FCC MPEs* in the Vicinity of the Proposed PCS Site, CL&P Communications Tower, Newtown, CT

Maximum RF Level**	Power Density (mW/cm²)	% of MPEs*
Calculated: proposed PCS antennas	0.000210	0.021%
Measured: sliding 30-min average (*peak* values)	0.000186†	0.093% ‡
	Total	0.114%

* MPE: The FCC limits for maximum permissible exposure (same as 1986 NCRP limits at the frequencies of interest)
** Levels occurring in a horizontal plane at a height of 6 ft above mean grade level.
† The values include the measurement uncertainty factor of 1.58.
‡ The Holiday instrument does not provide frequency data nor does it weight different frequencies for direct comparison with the FCC, IEEE or NCRP safety criteria. Therefore, in order to be conservative, the values in the table are compared with the most restrictive portion of the FCC limits, i.e., 200 μW/cm² for frequencies between 30 and 300 MHz.

Table 6: Summary of International, Federal, State and Consensus Safety Criteria for Exposure to Radiofrequency Energy at Frequencies Used for Radio Communication Systems (30 - 2000 MHz)

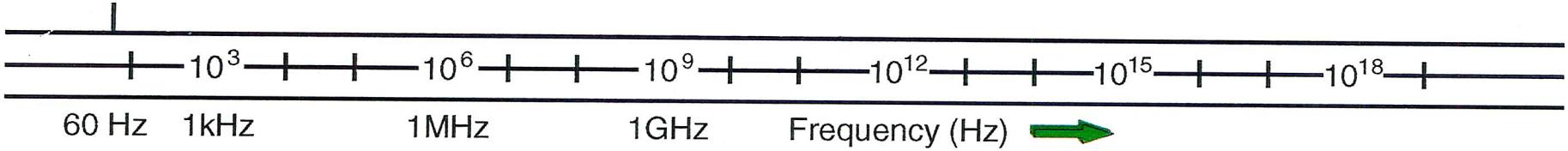
Organization/Government Agency	Exposure Population	Power Density (mW/cm^2)	
		30 - 300 MHz	300 - 2000 MHz
International Safety Criteria			
International Commission on Non-Ionizing Radiation Protection (1997)	Occupational	1.0	*f/400*[1]
(*Health Physics* 74:4, 494-522. (1998)[2]	Public	0.2	*f/2000*
National Radiological Protection Board	Occupational	1.0[3]	*5.0*[3]
(NRPB, 1993)	Public	0.7[3]	*2.6*[3]
Federal Requirements			
Federal Communications Commission[4]	Occupational	1.0	*f/300*
(47 CFR §1.1310)	Public	0.2	*f/1500*
Consensus Standards and Recommendations			
American National Standards Institute	Occupational	1.0	*f/300*
(ANSI C95.1 - 1982)	Public	1.0	*f/300*
Institute of Electrical and Electronics Engineers	Occupational	1.0	*f/300*
(ANSI/IEEE C95.1-1999 Edition)[5]	Public	0.2	*f/1500*
National Council on Radiation Protection & Measurements	Occupational	1.0	*f/300*
(NCRP Report 86, 1986)	Public	0.2	*f/1500*
State Codes			
New Jersey (NJAC 7:28-42)	Public	1.0	*f/300*
Massachusetts (Department of Health 105 CMR 122)	Public	0.2	*f/1500*
New York State[6]	Public	0.2	*f/1500*

NOTES:

1. f = frequency in MHz
2. Reaffirmed in 1997 and published, with modification, in 1998.
3. The NRPB guidelines have slightly different frequency ranges for their investigation levels. The values shown are the lowest values for the corresponding frequency range.
4. All licensees are required to comply with the limits outlined in 47 CFR §1.1307.
5. Incorporating IEEE Standard C95.1-1991 and IEEE Standard C95.1a-1998.
6. State of New York Department of Health follows NCRP Report 86.

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*



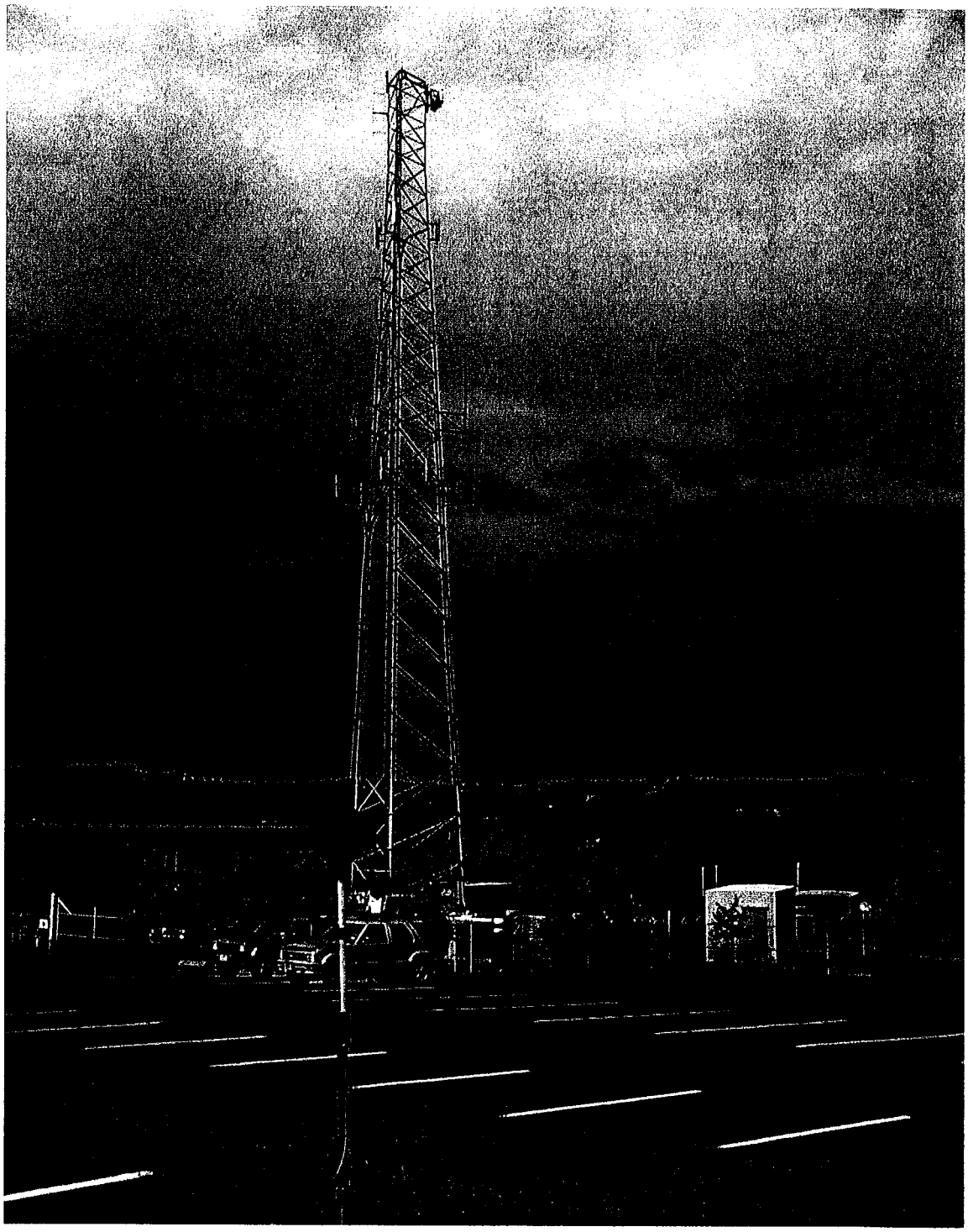


Figure 1. CL&P Radio Communication Tower, Barnabas Road, Newtown, CT
(RF measurement probe in foreground)

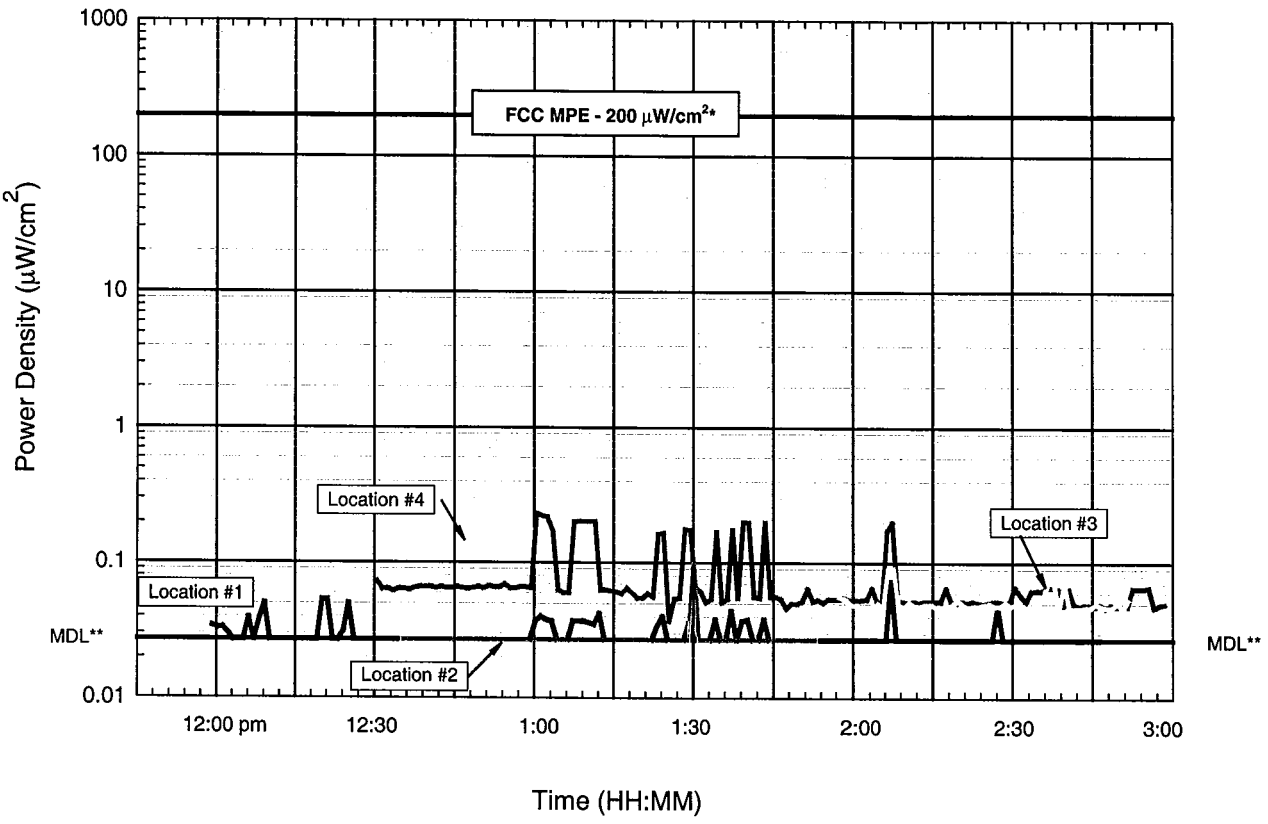


Figure 2. RF broadband measurements, CL&P Tower, Newtown, CT.

* The Holiday Industries instrument does not provide frequency data nor does it weight different frequencies for direct comparison with frequency-dependent safety criteria, such as those of the FCC, IEEE or NCRP. Therefore, the conservative approach is to compare the measured values with the most restrictive portion of the IEEE C95.1 limits for uncontrolled (general public) environments, i.e., 200 $\mu W/cm^2$ for frequencies between 30 and 300 MHz.

** MDL – minimum discernible level of Holaday measurement system, 0.027 $\mu W/cm^2$.

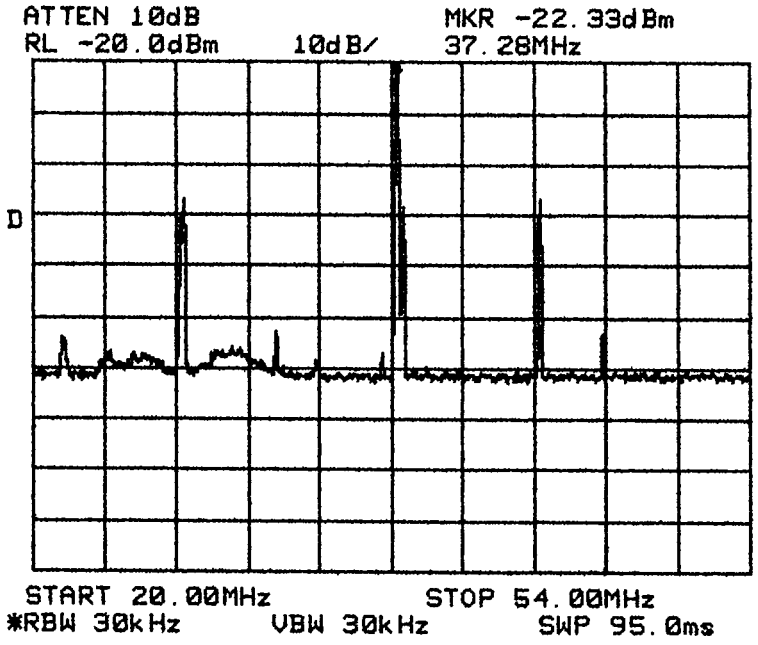


Figure 3. Land Mobile radio (20 - 54 MHz)

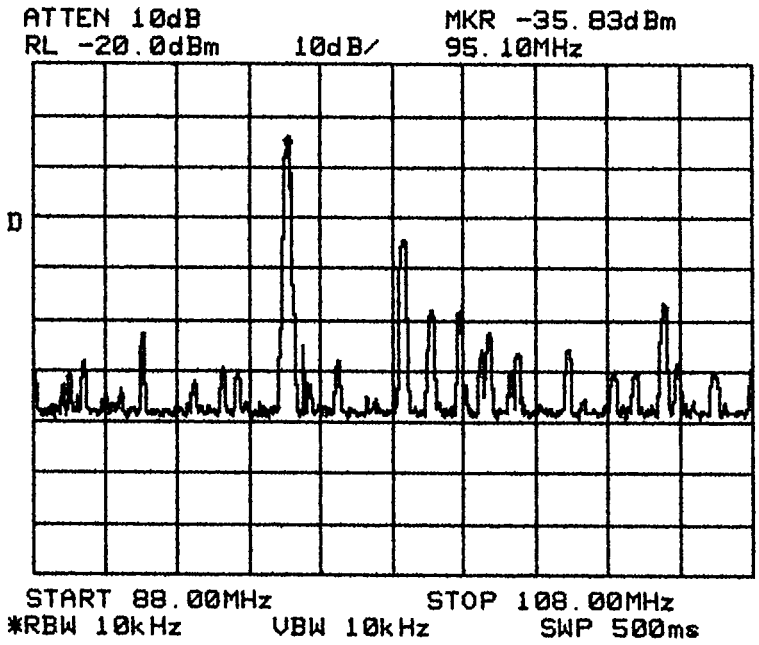


Figure 4. FM Radio Band (88 - 108 MHz)

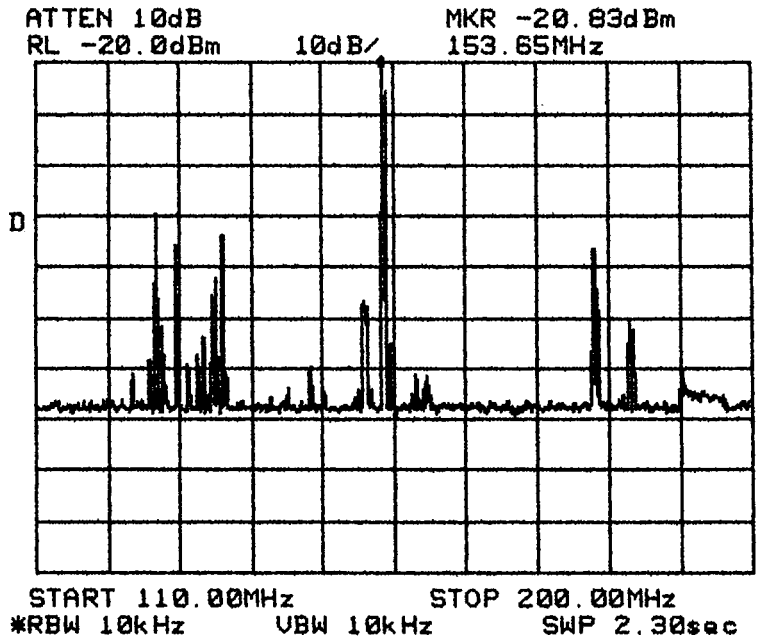


Figure 5. Land mobile radio (110 – 170 MHz)

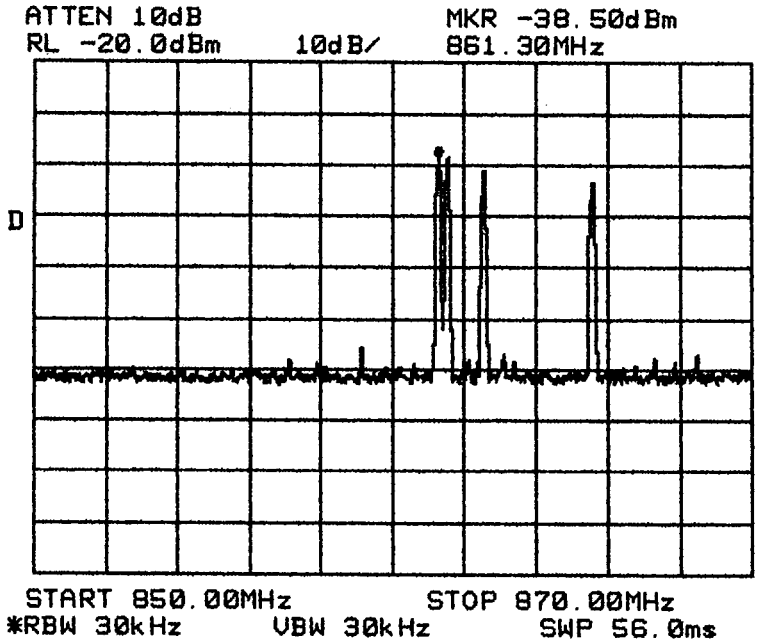


Figure 6. ESMR radio (850 – 861 MHz)

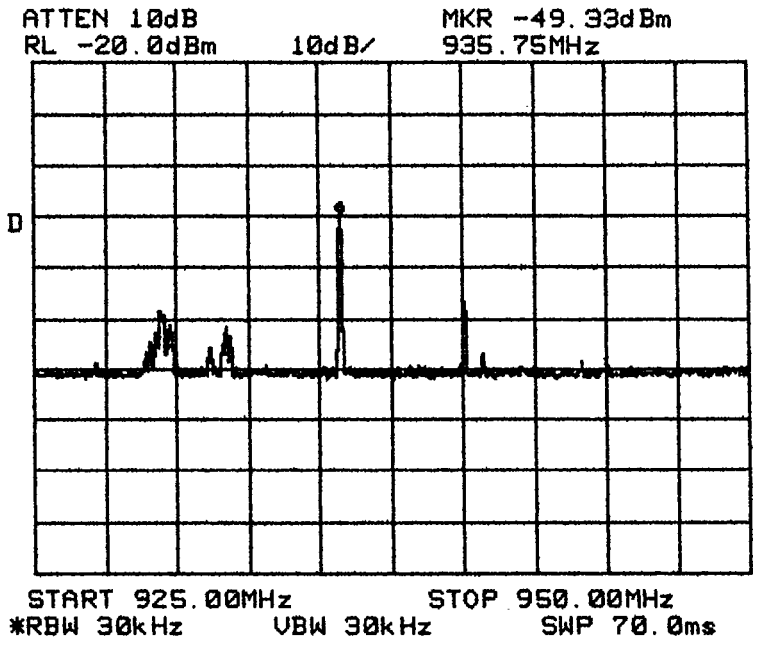


Figure 7. Paging/Data (925 - 950 MHz)

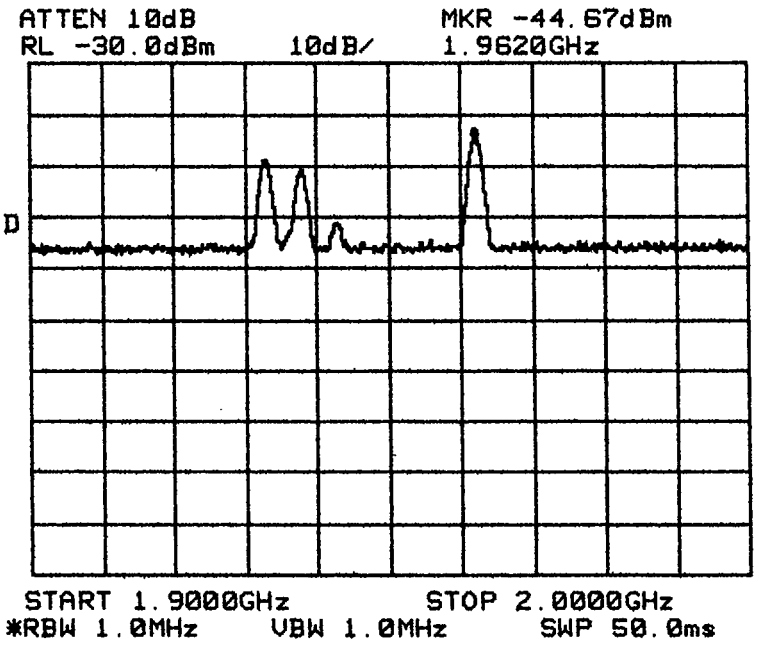


Figure 8. PCS (1930 – 1990 MHz)

APPENDIX 1

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[5]. The methodology described follows that outlined by the Federal Communications Commission (FCC) in their OET Bulletin No. 65[6].

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

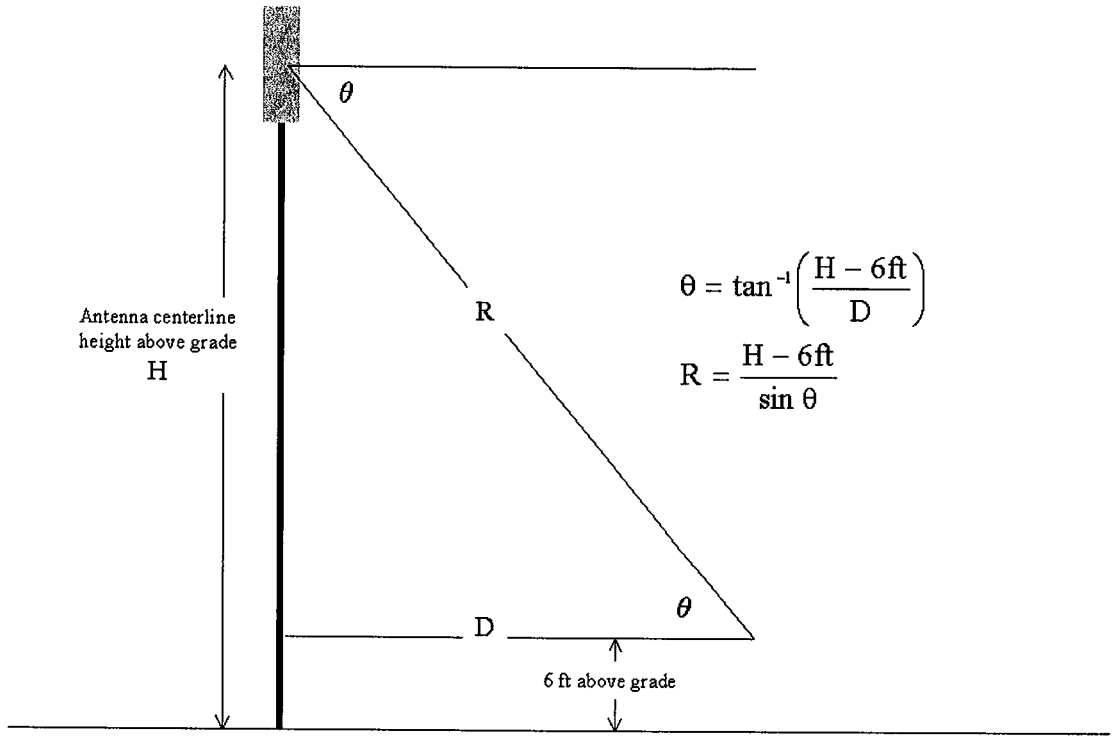
$$S_{max} = 4 \times S$$

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

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

6. 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:

$$R = (H\text{-}6)/\sin\theta = (136\text{-}6)/\sin(30°) = 260 \text{ ft}$$

$G_{30°} = -1$ dBd (from antenna elevation gain pattern - envelope)

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

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

$$= 4 \times \frac{8ch \times 3.98W/ch \times 10^{(-1dBd/10)} \times 1.64}{4 \times 3.14 \times (260ft \times 12 \times 2.54)^2}$$

$$S_{max} = 2.1 \times 10^{-7} \text{ W/cm}^2 = 0.00021 \text{ mW/cm}^2$$

$$\text{AND \% of MPE} = \frac{0.00021 \text{ mW/cm}^2}{1 \text{ mW/cm}^2} \times 100\% = 0.021\%$$

APPENDIX 2

EQUIPMENT LIST

Frequency Band	Manufacturer and Model #
Narrowband Equipment	
20 - 200 MHz	Hewlett Packard Model 8563E Spectrum Analyzer Electro-Metrics Model BDA-25 Broadband Dipole Antenna
200 - 500 MHz	Hewlett Packard Model 8563E Spectrum Analyzer Electro-Metrics Model TDS-25-1 Tunable Dipole Antenna
500 - 1000 MHz	Hewlett Packard Model 8563E Spectrum Analyzer Electro-Metrics Model TDS-25-2 Tunable Dipole Antenna
Broadband Equipment	
0.5 - 1500 MHz	Holaday Industries Model HI-3001 Isotropic Broadband Field Strength Meters with model HSE-01 (high sensitivity) probes and Model HI-3320 Dataloggers.