

*Kalorama Citizens Association
P.O. Box 21311
Kalorama Station
Washington, D.C. 20009*

March 19, 2001

**TESTIMONY BEFORE THE ZONING COMMISSION
CASE NO. 00-29TA, ANTENNA TOWERS**

I am Ann Hughes Hargrove, Chairman of the Zoning Committee for the Kalorama Citizens Association, which was founded in 1919 and represents much of the area known as Adams Morgan. I was authorized in February by the membership to testify on this case. Our association also endorses the specific recommendations of the Cleveland Park Citizens Association. Our general recommendations, and the carefully structured specific recommendations of the Cleveland Park Citizens Association, fall short just yet of recommendations of specific text language on certain important issues. This is appropriate at this stage.

Specifically, at this stage, we recommend the following in order to develop amended Zoning Regulations: (1) more scientific testimony other than from industry representatives and persons connected contractually with the industry, (2) additional exploration and mapping of the D.C. land use and radiation exposure situation and mechanisms to update the mapping, (3) a review of the emerging revised codes and legal actions in other jurisdictions, (4) testimony from DCRA and the Environmental Health Administration, (5) an interagency task force to address the multi-level problems associated with planning for, approving, and regulating these facilities, and (5) a regulatory process which includes D.C. certification of applicants as to potential compliance with radiation levels in relation to federal standards and D.C. monitoring of these facilities.

Land and population density, particularly in Ward 1

The concentration of antennas and towers in Ward 3 at key locations where people live, work, enjoy recreation, and attend schools is totally unacceptable, and certain of these installations should be dismantled. Each of the city's wards has a different land pattern. Ward 1, where I live, is the smallest ward in the city and has

the greatest density of population and very little vacant land. Based on updated 1990 census figures, some 69,778 people are crowded into 1,222 acres, a density ratio of 57 people per acre and 105 residents in each residential acre as compared to Ward 3's 72,705 people in 4,746 acres.¹ Where towers and antennas have been located thus far in the ward, they are on or adjacent to residential and school properties. It is virtually impossible in Ward 1 to achieve adequate spacing standards where large populations of people will not be affected, and this problem is found in varying degrees in all other wards.

Vacant and industrially zoned land

Does this mean that in the District of Columbia, we should look for large tracts of vacant land which can be developed or other land which, by various criteria, would be suitable for redevelopment? Or simply, industrial land? The District has very few large large tracts of vacant land eligible for use as development. These are in the main slated for mixed-use development, or are next to river ways, close to human recreation or habitation, or the monumental core. Similarly, an industry spokesperson the other night suggested industrial areas as logical placement areas for such facilities. As of tax year 1994, there were 1,839 acres zoned industrial, which represents 10.54 percent of the total of District of Columbia zoned acres, whereas residentially zoned land, some 14,999 acres, comprises 85.95 percent of the total zoned land.² Much of the industrial land, urban renewal land and vacant land is either being developed right now or is considered part of a reserve for future development schemes the city may hatch, such as the New York Avenue corridor, the Anacostia waterfront, Brentwood Avenue, Fort Lincoln and possibly even Fort Sims. Also, much of this land is contiguous to residential areas with minimal separation barriers, if any. Should these land reserves or redevelopment areas be used for towers and antennas now when tomorrow we might want them for something else and find it difficult to create mixed-use development around or in these sites? This poses a tricky dilemma for a city which can't spread its boundary wings.

With this special pressure of constricted land opportunities for this use

¹*D.C. at the Crossroads: Transportation Choices Today Could Bring Pleasant Living, Less Traffic Tomorrow*, Friends of the Earth, 2000.

²Figures obtained from the District of Columbia Office of Planning.

and associated residential populations, existing facilities must be mapped for purposes of further planning and siting. Siting of towers and antennas should be reviewed in relation to their apparent radiation emissions and compliance with federal standards, as well as to their proximity in relation to residential and other population, hospitals and health facilities, recreation areas, and schools. The Office of Planning should work with the District's Health Department, the NCPC, and other relevant authorities to undertake this project and update the work regularly. This work should be done in conjunction with strategic planning studies which would address future potential land uses for particular sites. The basic issue of where these facilities should go can't be fully resolved until we have a good fix on where they all are now, what the planning efforts are to be for various areas potentially affected that are not yet fully developed or inhabited, and to what extent we want to gamble on possible health risks.

Special exception coverage

It is good to have special exception coverage in all zones, as was intended in the 1989 order covering commercial broadcast towers and other receiving and emitting facilities. Revised regulations, in addition to dealing with height and location in proximity to uses which may be adversely affected, need to cover radiation and locational requirements.

The new regulations should provide that the special exception should be approved for a period of five years, subject to the condition that at any time the FCC standards for RF exposure is changed so as to render the facility non-complying, the facility cannot continue to operate unless it can be brought into compliance. Perhaps a grace period is necessary, such as one or two years. The NCPC guidelines for installations associated with federal properties, "Guidelines and Submission Requirements for Antennas on Federal Property in the National Capital Region", require a review at the end of a 5 year approval period, but its not clear from reading Section 5 that there will be requirements to measure radiation at that time although section 6 details requirements for initial application, including a certification by the agency that the proposed installation complies with the FCC's RF radiation guidelines, the NTIA or any other applicable federal standard.

As for the District's regulations, whether judgment on compliance is to be exercised only at the end of a 5 year special exception period or also when

emission standards change within the period, how can this be done if it is the cumulative effect of a clump of antennas or whips that goes beyond the standard, each one of which may be below the limit? And how will this effect be measured? And by only the applicant? Which facilities would have to be deleted-- the most recently approved, or the older ones, or those with outdated technology? How would we go about determining whether the facilities are state of the art so that we could force their upgrading or replacement if they are not? This issue, raised at the last roundtable night, deserves additional scrutiny and should be dealt with in the amended regulations along with new responsibilities through the District's Department of Health, which accordingly should be budgeted and staffed to approve and monitor radiation levels in relation to federal standards.

A related issue is that of exploration of dealing with facilities presently existing. Ideally, the Commission should treat all such pre-existing facilities—that is facilities existing prior to zoning changes (including those that may be associated with this case) as special exceptions without lasting grandfather rights and subject to the five year renewal with more stringent requirements developed by the Commission through these hearing processes. If these requirements cannot be met, then the installation should be removed. These facilities are decidedly different from other uses of land and structures.³ The issue here is simple: in view of the Zoning Act of 1938 as amended, how much latitude is there for allowing non-conformity of existing facilities to continue, at least as to radiation standards and possibly also in relation to any locational criteria developed? This bears further exploration. Careful drafting of the standards for new installations and their subsequent monitoring, if our options are limited on action that can be taken with currently existing facilities, is essential to avoid problems with changing standards in the future. This would mean that approved installations would have to adhere to the standards required and agreed to when first installed (see Cleveland Park listing of standards) which should additionally include a requirement that the radiation

³Sections 2001.11 and 2001.12 in the non-conforming uses and structures section of the Zoning Regulations lift antennas and towers out for special reference, with the first of these stipulating the following: “A nonconforming antenna shall not be altered, modernized, or otherwise replaced, except in conformity with all provisions of this title.” The second of these deals only with the issue of an antenna which stops functioning in which case a temporary replacement may be allowed subject to the conditions enumerated.

emissions must be in compliance with federally set standards as standards change, perhaps with a grace period of one year if standards change during the five-year period. While examination of District law is necessary to make this possible, it would not necessarily be in conflict with the Telecommunications Act. Such actions would not prohibit or have the effect of prohibiting the provision of wireless telecommunications service, an important requirement of the Act. It is also possible that legislative action may be possible regarding bringing existing installations into compliance with radiation standards on a licensing basis. Additionally, like the NCPC provisions in its Guidelines, towers which are no longer needed should be removed promptly, and other features of the NCPC guidelines are worthy of incorporating in the new regulations.

Initial approval of facilities

The spacing or setback standards should be examined further. This standard should not only deal with distance--and it should be distance from all sides--in relation to the height of a tower. It also should take into account more precisely the direction of the beamed radiation and its concentration points in light of federal radiation standards. **The radiation perimeter must not only be measured at ground level but also from the points along the tower where radiation is emitted so that, for example, a four storey building a short distance away with stories at the same level as the emitting radiation from the tower would be protected against excessive radiation.** While locational criteria are essential for our regulations, including the possibility of an absolute spacing standard of, say, 300 feet, so are requirements relating to radiation, including cumulative radiation. **Measurements of cumulative radiation will have to be accomplished through spectrum analysis.**

Obviously it is necessary to review carefully the emerging code changes and challenges in the case law on these kinds of issues. Section 704 of the Telecommunications Act preserves local zoning authority while at the same time laying down certain limitations on its exercise, which may or may not be within constitutional bounds as to the First, and especially, the Tenth amendments of the US Constitution. Citizens in various parts of the country are moving to have the relevant authorities revise codes as necessary to take into account both radiation levels and locational criteria, and in some instances have spawned outright

moratoriums.⁴ In fact, our country lags well behind actions taken by countries in Europe in not only setting more restrictive radiation standards and establishing adequate enforcement machinery, but also to exercise greater care in location of such facilities as exhibited in the table in the video recently viewed by the Commission, materials in the record, and in excerpts from the Washington Times attached to this testimony from Italy. A good summary of the lack of regulatory capability in our country is described in testimony by Roger Mattson, an expert in radiation standards who has worked extensively in the fields of nuclear safety and radiation protection whose testimony before the Board of County Commissioners of Jefferson County, Colorado (attached).

The specific recommendations in the Cleveland Park Association testimony regarding filing requirements with the Zoning Commission should be incorporated in the Zoning Regulations. The applicant should be required to attest to compliance of the proposed facility with federal radiation standards. A requirement that the District's Health Department independently make a determination about potential radiation in relation to location and existing facilities, and monitor thereafter, should be added, along with language requiring compliance with any new radiation standards established by the FCC as discussed above.

Emergency order and actions needed thereafter

In fact, the Commission should consider an emergency order until the city undertakes an adequate review of the location of these facilities and the current radiation levels emanating from them and drafts new Zoning Regulations. While the Council has recently taken action regarding towers and their heights, including a directive that the Mayor formulate a policy dealing with some of the locational criteria we have enumerated, the Commission should consider an emergency order on its own because of the concentration of towers and

⁴Portland, Oregon, for example, has zoning regulations which apply provisions for measuring radiation to TV/Communication towers. In San Francisco, citizens have moved to have a temporary moratorium on new cell towers until independent scientific tests are made to determine whether antennas are meeting existing FCC standards. Berkeley, California has a moratorium enacted by the Council in the form of an appeal to the Council from the Zoning Adjustments Board's decision regarding cell-phone antennas.

antennas and potential radiation in excess of federal standards. This should entail the Zoning Commission approaching the Mayor to request revisions in the budget to allow the study alluded to and subsequent establishment of the capability to undertake the monitoring of radiation emissions. The policy or plan would incorporate additional criteria than those specified in the Council legislation.

If the Office of Planning could spearhead the development of a “Telecommunications Plan” to complement language in the Comprehensive Plan, comply with Council emergency action, identify existing facilities and provide for updating additional facilities, and incorporate siting guidelines; and if a related office in the city’s health department were set up to use monitoring equipment for the purpose of initial approval of permits for cellular base stations, microcell, or future generation antenna facilities, and monitoring of existing facilities (including cumulative impacts), we would be headed in the right direction.

At this point, I can imagine your throwing up your hands in consternation. But the fact that some of these steps may be hard to work out, doesn’t mean such a comprehensive approach should be rejected. This Capital city is clobbered with all kinds of communication facilities—broadcast TV, HDTV, FM/AM radio, cell phone, GPS military, foreign mission, national security, FAA. It is alive with energy, and yet we are in the dark about many of the locations, types of facilities, and amounts of radiation, and the plain fact is we are saddled with a local regulatory system that is inadequate to deal with both present and future facilities.

This emergency order would amount to a temporary freeze as distinguished from a prohibition. In *Sprint Spectrum, L.P. v. City of Medina, Washington*, a federal district court has ruled that a short moratorium (this one was for six months) is not “a prohibition on wireless facilities, nor does it have a prohibitory effect. It is, rather, a short term suspension of permit issuing while the city gathers information and processes applications.”⁵

⁵Sprint Spectrum, L.P. v. City of Medina, 924F.Supp.1036 (W.D. Wash.1996)(Medina). For a good summary (attached) of guidelines emerging from case law, see “Federal Developments Affecting Municipalities on Zoning and Siting of Cellular Towers” by John W. Pestle and Charles N. Ash, prepared for Litigation and Regulation Advocating Local Government Interests in Telecommunications, National Association of Telecommunications Officers and Advisors, 1999,

Fees and Approvals

Interestingly, the San Francisco Council is charging fees to all Telecommunications Providers for telecommunications facilities and systems engaged in using public property or public rights-of-way or private property that include a surcharge fee for 5 years to recover costs of developing and implementing the ordinance, an annual registration fee of \$3,400, and extensive permit and inspection fees. **This type of elaborate fee structure (attached) could serve as a basis for recovering costs of setting up a first-rate operation in the District.**

As I understand it, DCRA charges \$25 for antennas, with no extra charge by the linear foot. Additionally there is a charge of 2% of the cost of attachment of the antenna to a structure plus \$30. For a tower, the charge is \$35 for each \$1,000 of cost per work. There can be an additional charge for erosion control of \$35 to \$70. It appears that there is no review of non-ionizing radiation applications by the Health Department which is now separate from DCRA. The District's Department of Health only reviews ionizing radiation, such as is emanated in conjunction with x-ray equipment and other medical equipment and not microwave or electromagnetic sources. (These approvals are done through the Food, Drug and Radiation Bureau under the Department of Health which is part of the Environmental Health Administration.) **So, there appears to be a missing step which should be provided for in that there appears to be no certification requirement by the applicant that the non-ionizing facility in question is in compliance with federal radiation standards, and as already suggested, no capacity in the DC government to make independent calculations and measurements. It would be good to have government witnesses explain what they do, how much they charge, and what will be necessary to be done to bring accompanying legislative, budget, and Mayoral action to develop a comprehensive program.**

Attachments:

1. Testimony of Roger Mattson, expert in nuclear safety and radiation protection before the Board of Commissioners, Jefferson County, Colorado, May 27, 1999.
2. Conference on "Electromagnetic fields interactions with living matter" excerpts, February 9, 20001

3. *Federal Developments Affecting Municipalities on Zoning and Citing of Cellular Towers* by John W. Pestle and Charles N. Ash for the National Association of Telecommunications Officers and Advisors, June 25, 1999, Washington, D.C. as copyrighted by Varnum, Riddering, Schmidt & Howlett LLP.
4. Table of standards Telecommunication Act on maximum permissible exposure (MPE). Entails limits for occupational/controlled exposure as well as limits for the general population/uncontrolled exposure. Also a table on maximum permissible exposure (MPE) illustrating plane-wave equivalent power density.
5. Local Officials Guide: Siting Cellular Towers, *What You Need to Know; What you Need To Do* provided by a group of national organizations, 1997.
6. One of many health-related studies: *Chronic Fatigue Syndrome—Is Prolonged exposure To Environmental Level Powerline Frequency Electromagnetic Fields A Co-Factor To Consider In Treatment?* By D. Maisch, B. Rapley, R.E. Rowland, J. Podd, copyrighted in August, 1999.
7. The Washington Times, March 17, 2001, p. A-5 regarding Italy and a related blurb carried in the Times of India on May 14, 2000 regarding electromagnetic levels associated with Vatican Radio.
8. Towers and historic preservation agreement (Communication Daily 3/19/01). The Advisory Council on Historic Preservation (ACHP) signed an agreement designed to streamline communications tower colocation reviews as crafted by FCC, ACHP and the National Conference of State Historic Preservation Officers.

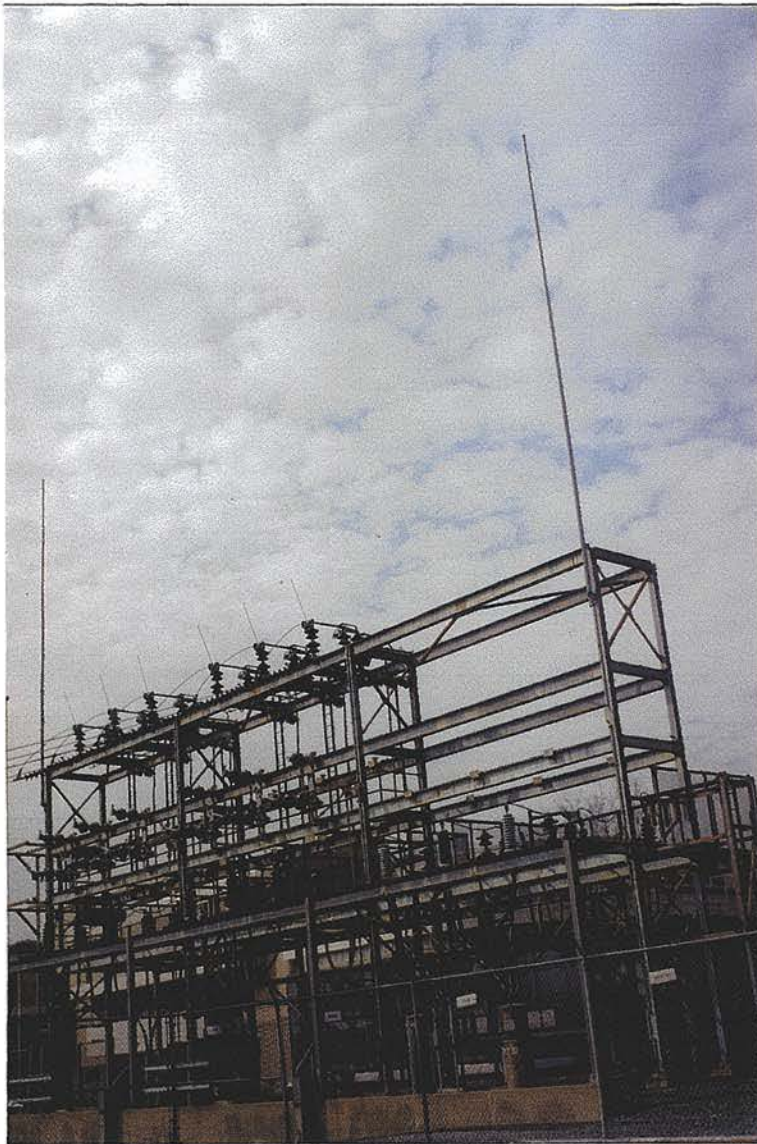
SAMPLING OF COMMUNICATIONS INSTALLATIONS IN WARD 1 (3)



**Tower adjacent
to residences**



SAMPLING OF COMMUNICATIONS INSTALLATIONS IN WARD 1 (1)



**Telephone switching facility,
transformer, and antennae
adjacent to elementary school
and its recreation area . . .**



... and across 30-foot street from residences



SAMPLING OF COMMUNICATIONS INSTALLATIONS IN WARD 1 (2)

Tower atop youth learning center . . .



. . . and adjacent to residences



☆☆☆ COMMISSIONERS' MINUTES OF MAY 27, 1999 ☆☆☆

The Board of County Commissioners of the County of Jefferson, State of Colorado, met in special session on May 27, 1999 in the Jefferson County Government Center, Golden, Colorado. Commissioner Patricia B. Holloway, Chairman, presided. Commissioner Michelle Lawrence, Commissioner Richard M. Sheehan and Teri Schmaedecke, Deputy Clerk to the Board, were present.

Commissioner Holloway, Chairman called the meeting to order.

STAFF PRESENT:

Ron Holliday, County Administrator
Frank Hutfless, County Attorney
Tim Carl, Planner

REGULAR AGENDA

#98015154RZP1

Rezoning
Applicant: LAKE CEDAR GROUP LLC
Location: 21079 Cedar Lake Road (Section 4, Township 4 South, Range 70 West)
Map No.: 107
From: Agricultural - Two, (A-2), Mountain Residential - One (MR-1)
To: Planned Development
Purpose: To construct a consolidated television broadcasting tower for digital television.
Approximate Area: 79.8 Acres
Case Manager: Tim Carl
Continued From: 2/2/99, 3/10/99 and 4/27/99

Sworn Testimony: Deb Carney, Attorney Representing C.A.R.E.
Professor Gary Olhoeft, Colorado School of Mines
Bob Crowder, Concerned Citizen
Maria Fulinwider, Concerned Parent
Karen Barker, Concerned Citizen
Roberta Bolton, Concerned Citizen
Dr. Henry Lai, Research Scientist
George Pardos, Ophthalmologist
John Reif, Colorado University, Dept. of Health
Molly Balmes, Concerned Citizen
Bob Barrett, Concerned Citizen

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Ron Selstad, President of Genesee H.O.A.
Roger Hutchison, Economist
Basil Katsaros, Real Estate Appraiser
Bruce Debosky, Attorney/Concerned Citizen
Don D'Antuno, Concerned Citizen
Alfred Hislop, Concerned Citizen
Les Larsen, Telecommunications Consultant
Shirley Olinger, Nuclear Engineer
Roger Mattson, Concerned Citizen

Following the taking of sworn testimony and a general discussion, the Board upon motion of Commissioner Lawrence, duly seconded by Commissioner Sheehan and by unanimous vote, adopted a resolution continuing Case #98015154RZP1 to a future date to be agreed upon by the Board of County Commissioners.

ADJOURNMENT

There being no further business to come before the Board, the meeting was adjourned.

Attest:

Board of County Commissioners of
the County of Jefferson, Colorado

Teri Schmaedecke, Deputy Clerk

Patricia B. Holloway, Chairman

1 SHEEHAN: Your one slide on our community has the highest
2 levels of RF radiation in the nation. What is your source on that?

3 OLINGER: That's numerous sources from the FCC they have
4 quoted that to Al Hislop. And looking at just radiation levels in other
5 communities looking at the studies.

6 SHEEHAN: Maybe if someone could just kind of point me the
7 way to the exact piece of paper that shows me the source on that at some point
8 with the CARE group, I would appreciate that.

9 CARNEY: That was Jerry Uhlich of the FCC said it to Carol
10 Lomond and we have repeated it to the FCC and they have never denied it.

11 SHEEHAN: Well, I don't know if it's written, if it's written some
12 way or substantiated some place, I need that. I need that as factual record, I
13 guess for my basis of decision.

14 MATTSON: Good evening, my name is Roger Mattson. M-A-T-T-
15 S-O-N. I reside at 481 Crawford Street in Golden, that's Tripp Ranch right at the
16 base of Lookout Mountain. I am an expert in radiation standards. But, I also
17 have a bias, so my residence is a bias, I also have 14 members of my family
18 living in 5 households living within about 5 miles of this mountain. So, that's my
19 bias now I will talk about what I know as an expert. I have spent my adult life in
20 nuclear safety and radiation protection. Half of my career with the federal
21 government with the federal regulatory agencies for Nuclear Safety and
22 Radiation Protection and the Atomic Energy Commission, the Nuclear
23 Regulatory Commission and the Environmental Protection Agency. For a period

1 in 1980 and '81, I was the Director of EPA's non-ionizing radiation standards
2 activities. It is with that background that I would like to tell you that this isn't all
3 about money. And you can't get off that easily. Because, no public health
4 agency in America has stepped forward to address this problem. FCC is not a
5 public health agency and EPA has killed it's program in this area. The public
6 health decision has flown downhill and it's on your desk. And I would like to
7 illustrate why that is the case by showing you briefly the history of these
8 radiation standards in America and in the Soviet Union and then telling you what
9 the FCC and the EPA say today about their roll in this area. Quickly, to recount
10 what the standard is. You have heard the 200 micro-watt per square centimeter
11 referred to by a number of people and you heard one person say that, that's
12 really an over simplification. Mr. Hislop talked about how the standard goes up
13 as the frequency of broadcast is up. That's very true, but it is convenient to talk
14 about two microwatts as a simple representative sample if you will, of the
15 standard. You have also heard no doubt that it's based entirely on thermal
16 effects, that is the cause of heating in tissues and organs of human bodies or
17 animals that have been subjected to this kind of radiation. To say it's based on
18 thermal effects only means that it takes no account of possible chronic or
19 stochastic effects including cancer that might be induced by long term low level
20 radiation of human beings. You should also bear in mind that the standards we
21 are going to talk about are all based on research that was complete basically by
22 1990. So, when you have heard the researchers earlier tonight say that there
23 has been a marked changed in the direction of the research and the results of

1 the research in the last five years that means none of the standards take
2 account for these long term, low level effects that are now being disclosed.
3 Although people petitioned the Federal Communications Commission to include
4 sensitivities of the limiting members of the population when they picked the 200
5 micro-watts they chose not to. When people said you should include the non-
6 thermal effects that are available in the literature, they chose not to. It isn't that
7 they addressed them and found them wanting, they chose not to. When people
8 recommended to the FCC in the rule making to set the 200 micro-watts per
9 square centimeter, that they introduce the concept of ALARA that's applied in
10 every other radiation control activity everywhere in the world. FCC chose to
11 even ignore the comment and not respond to it. This is all in the literature of the
12 background of the development of the Federal Communication Commission
13 standards. I would point out one more thing about those standards and that is
14 that they're not independently administered. Every other hazard that we are use
15 to dealing with either the FDA or OSHA or the Nuclear Regulatory Commission,
16 or EPA has an independent oversight of the promotional agency, what we have
17 with FCC is much like what we had with the Atomic Energy Commission prior to
18 1975, when the Congress split up the promotional and regulatory activities of the
19 Atomic Energy Commission. Finally something that is not on the slide but it's
20 clear to me tonight that people are misunderstanding it. Two hundred micro-
21 watts per square centimeter is not a safety limit. No federal agency has set it as
22 safe limit, it is a guideline used by FCC How do they use it? They use it to
23 decide when to require a particular applicant to do an environmental impact

1 statement. The applicant can make a case that they are going to be below 200
2 to the effected public, they don't have to do any I.S. If they are over 200 then
3 the FCC regulations says they have to do an E.A., environmental assessment
4 and then the assumption would be that FCC would do any I.S. That's not the
5 same as a safety limit. FCC is not saying and has not defended 200 micro-watts
6 per square centimeter as safe. No one has declared it safe. It's really important
7 to understand this, it's a bureaucratic approach to how you implement the
8 National Environmental Policy Act. If you need more advice on understanding
9 that I am sure your attorney can help you understand that regulatory gimmick.
10 It's not a safety limit. Okay, let's look at where the standards came from
11 because they varied a lot and I want to make the point that they are going to
12 continue to vary. In fact, I am going to quote the FCC for you, cause they are
13 going to tell you that they are going to continue to vary. The first that we knew
14 of when I was at EPA of the concern about RF was from the Navy and it had to
15 do with radar and it was in the early 50's. And it was when we were really
16 building up to fight the Soviet Union and they observed cataracts in dogs that
17 they exposed. They observed diseased workers that were exposed when they
18 were working right on the radar. And the Navy published a standard for workers
19 of 10,000 micro-watts per square centimeter. About the same time the Soviets
20 apparently had the same kind of problem and set a limit that was ten micro-watts
21 per square centimeter. A thousand times lower to protect the Soviet workers,
22 then we had set in our armed forces. In 1966 the Army requested the American
23 Standards Association, what we know today as ANSI to take a look across the

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1 Armed Services and give D.O.D some advice as to what the standard ought to
2 be. They looked and they affirmed the earlier value of 10,000. In 1971 there
3 was about a four or five year study concluded called Project Pandora, it was
4 fairly secret at the time. Where the Soviets had bombarded the Embassy in
5 Moscow with 10 to 15 micro-watts per square centimeter of RF radiation around
6 the clock. It had been detected, people were worried about it, people in the
7 foreign services, especially that lived there and worked there. Project Pandora
8 for the government concluded that there was no need to change the standard.
9 Of course there were a lot of government people involved in that and as I said
10 probably secret in those days. In 1976 ANSI took a look again and again
11 affirmed the ten thousand micro-watts per square centimeter. Then in 1977 a
12 book was written in America as often happens, a man by the name of Brodeur,
13 wrote a book called the Zapping of America if I remember it's title correctly. And
14 charged that there had been a cover up of these affects because of the large
15 investment by DOD in radar and that the government was covering up the
16 effects. Short time later there was a big outcry in the United States, people
17 wanted more done by the EPA, we had a program in those days, I was there in
18 '80, there were three or four people working this program for the whole United
19 States, today I think there are none. In '79 the Soviets decided to set a standard
20 for the public not only their workers and it was one micro-watt per square
21 centimeter. To the best of my knowledge that is still what they use today. In '82
22 because of the response to the Brodeur book, ANSI looked again and dropped
23 the standard again by a factor of ten for workers. Notice that so far it's 1982 and

1 nobody has set a standard for the public in the United States, it's only for
2 workers. In '85 the Federal Communications Commission adopted the '82 ANSI
3 standard and extended it to the public. So, by '85 our government finally
4 decided that it was important to address the Public Citizens. In '86 the National
5 Council on Radiological Protection, the NCRP the prestigious group of scientific
6 gray beards in America that advises on all radiation standards, everybody
7 follows NCRP said it ought to be 200 micro-watts per square centimeter. A
8 thousand was okay for workers, but there ought to be two tiers, 200 for the
9 public. The American National Standards Institute, a fine organization based
10 largely on industry standards often with government participation, I participated
11 in a number of ANSI standard efforts directed in RC's efforts in those regards for
12 years. They issued a somewhat different standard but for the frequencies we
13 are interested in for Lookout Mountain same level basically, 200 micro-watts per
14 square centimeter, for the public, two tiers another one for the workers. And
15 then '96 FCC looked backwards and said oh, well we might as well revise our
16 standards because NCRP and ANSI have revised theirs. They undertook a
17 public rule making, I have referred to that a couple times already if you have
18 never read the FCC report and order on the public rule making associated with
19 this two hundred micro-watts per square centimeter and you want to know a little
20 bit about where all this comes from you can download it from the internet it's
21 about 100 pages and you probably only need to read about twenty of it because
22 some of it the deals were things that we are not interested in here. One of the of
23 the most important things that they said when they issued that '96 standard I

1 want to read to you. We note that research and analysis relating to RF safety
2 and health is ongoing and we expect changes and recommended exposure
3 limits will occur in the future as knowledge increases in this field. Now you have
4 heard from some of those researchers tonight. Guess what's going to happen to
5 those standards? They are not going up. They are going to do like ionizing
6 radiation standards have done in past history, they are going down. Okay, so
7 that's the only point I want you to remember of what I said. Here is where they
8 came from, there not mysterious, they are at two hundred and they are going to
9 change. I want to quickly draw some parallels to the ionizing radiation standards
10 area because there are more years of development there and maybe there are
11 things to be learned from that history. First of all in ionizing radiation there is a
12 lot more international cooperation, there isn't this the Russians do that we do
13 this, the Chinese do something else and Western Europe does this, ICRP brings
14 all of that together and civilized nations follow, ICRP. We do, the Russians do,
15 the Chinese do, it's all over the world. Everybody follows the international
16 direction. There are independent standards in ionizing radiation they are set by
17 EPA and then they are implemented or regulated by the Nuclear Regulatory
18 Commission for a broad range of nuclear applications, from medical applications
19 to smoke detectors to nuclear power plants, to fuel cycle facilities across the
20 board. You don't have that in the non-ionizing radiation area as Shirley Olinger
21 said the "fox in the chicken coop". Because FCC is setting these guidelines
22 EPA has no staff anymore and so they are both regulating and promoting. In
23 ionizing radiation you have got many years and hundreds of millions of dollars of

1 research on long term low level exposure. You don't have anything like that on
2 RF. These guys that are talking about the results of their research, its pittance
3 there is nobody sponsoring that research at any level in America today. In
4 ionizing radiation, what they did is they said we don't know for sure the kinetics
5 of how ionizing radiation harms people, and so we are going to go look for the
6 first indications scientifically of any influence on the human body of ionizing
7 radiation and that first influence is in the breakdown of chromosomes and you
8 can observe those clinically in the laboratory. That occurs at about 50 RIM a
9 measure of ionizing radiation. For workers then they set the limit ten times lower
10 than that, for the workers annual exposure, at five RIM that was in the early days
11 it has actually been decreased from that today. Today the public exposure is a
12 factor of 200 for nuclear power plants for the public, 200 lower than the worker
13 exposure. So a factor of 2,000 below the first clinically observable effect on the
14 human body. Think of what a different standard that is then what you have
15 heard from RF, two hundred micro-watts per square centimeters well above
16 where research our measuring melatonin decreases, other things you have
17 heard about today. Not necessarily bodies, not necessarily cancers, but effects
18 on the human body. If it was ionizing radiation the standard would be below
19 that. So, there is something amiss in the way our Country is approaching this
20 question. Ah, the other point is this concept of ALARA and remote sighting. In
21 ionizing radiation, let's pick nuclear power plants as an example. In the early
22 days in the '60's and '70's when that industry was taken off like a rocket. People
23 wanted to build nuclear power plants in downtown New York, people wanted to

1 build nuclear power plants on a artificial island just off L.A. Citizen's like these
2 citizens stood up and said "no, we don't want them there, there is too much
3 unknown and the Government responded affirmatively and adopted a remote
4 siting policy for nuclear power plants in America. The other thing they adopted
5 was this concept of ALARA and it's a simple concept. You do what is
6 economically feasible to do to reduce unnecessary exposure as low as
7 reasonably achievable. I am going to make a couple quick observations, I think
8 you are the defacto public health agency for this decision. EPA has no program,
9 FCC has set a guideline. If I could just read you what FCC says about itself in
10 this same rule making "in the past the commission has stressed repeatedly that
11 it is not a health and safety agency and would defer to the judgement of these
12 expert agencies with respect to determining appropriate levels of safe exposure
13 to RF energy. We continue to believe that we must place special emphasis on
14 the recommendations and comments of Federal Health and Safety Agencies,
15 because of their expertise and their responsibilities with regard to health and
16 safety matters. There is none, there is no public safety agency in RF, EPA's
17 program died five, six years ago. All they can do is comment from the
18 administrator on what FCC does without any research, without any technical
19 staff, without any standards of their own, without any independent investigations.
20 They used to do the studies that you were asking for, what's the most exposed
21 place in the United States? I have a paper in my briefcase, I can tell you what it
22 was in 1980 because EPA published reports like that. They don't do that today.
23 You are the public health agency, the buck stops here. Because nobody else

1 has done it, FCC only has a guideline. Another observation, principals of
2 ALARA and remote siting can apply to non-ionizing radiation and you can apply
3 them. There is no statute that says that is outside of your responsibility. You
4 want it as low as achievable because of what you heard from your citizens and
5 you want it remote and Lookout Mountain isn't remote. Another observation
6 there is a growing body of science on long term effects and low level effects and
7 there will be some. You have seen harborings of them here tonight, there will be
8 others and you should expect further reduction and radio frequency radiation
9 limits, FCC has predicted it, history proves it, it has gone on across the world.
10 All the Western European nations have diminished their standards to below 10
11 micro-watts, in fact they are 20 below us now. If you don't believe the
12 Russian... how about the Chinese, the Chinese are 50. Our standards will go
13 down. This observation is maybe Dr. Mattson practicing law without a license.
14 But, I want to offer an idea to you. The new tower's ten megawatts, you have
15 got ten megawatts up there already. Mr. Hislop says they are above 200
16 microwatts per square centimeter in some spots as we sit here tonight at 10
17 megawatts. That is prima-facie evidence that 20 megawatts will exceed the
18 standard under FCC's own rules, that requires an environmental assessment,
19 there hasn't been one. FCC has not followed 40CFR 1.1301 it requires an EA if
20 the expectation of the new construction exceeds 200 microwatts per square
21 centimeter you have measurements by FCC, local citizens that prove it will be
22 above two hundred microwatts per centimeter. You ought to tell them "take your
23 tower back and do what your requirements, require you to do". So, in

1 conclusion, you ought to require somebody to examine reasonable alternatives
2 with lower public health risks, that is you ought to apply ALARA. And because
3 the standards will become more stringent you should apply prudence, you
4 should put really big towers away from people, not in the middle of people. You
5 ought to deny this application until FCC meets it's owns rules and examines the
6 alternatives under NEPA it as it promised it would and you ought not to entertain
7 them bringing it back until their standards address low level long term effects of
8 radio frequency radiation. That concludes my remarks, if you have any
9 questions, I would be glad to answer them.

10 HOLLOWAY: Okay, alright thank you. For all intents and
11 purposes, it's 10:00, so we probably shouldn't start another testimony. There
12 was some confusion apparently we had set these dates earlier because things
13 have been changed. Apparently we did not set that third meeting yet, so we
14 will...

15 HOLLIDAY: May I make a suggestion.

16 HOLLOWAY: Ah, huh.

17 HOLLIDAY: I would suggest that we work with the parties to find
18 a mutually acceptable date, especially for the all day session, that was
19 contemplated when we originally negotiated this out. There are a number of
20 people still signed up and I don't know how much public testimony is really going
21 to be required but I believe in chatting informally with the representatives from
22 both side that, that approach is acceptable. And so within the next few days we

1 should find a mutually acceptable date or dates that will work for your calendar
2 as well.

3 HOLLOWAY: Okay, so do we move to just postpone until we can
4 get an agreed date? Is that...

5 HUTFLESS: Yeah, just a motion to continue the hearing subject to
6 a date agreed upon by the Board.

7 LAWRENCE: Okay, we he said (laughter) I move that we continue,
8 do you need the number?

9 HUTFLESS: No.

10 LAWRENCE: Okay, we continue this hearing until we work with the
11 parties to get a mutually acceptable date.

12 SHEEHAN: Second.

13 CLERK: Commissioner Lawrence?

14 LAWRENCE: Yes.

15 CLERK: Commissioner Sheehan?

16 SHEEHAN: Yes.

17 CLERK: Commissioner Holloway?

18 HOLLOWAY: Yes. Okay, we are adjourned until next time.

19

20

"Electromagnetic fields interactions with living matter".

Workshop organized by Bioelectromagnetic Society.

February 9, 2001

Organizing committee: Ewa Czerska (301) 594-1212x119
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2 blocks from the Dupont Circle Metro stop

AGENDA:

- 8:00am** **Opening Remarks:**
Ewa Czerska
Food and Drug Administration
- 8:15am** **Mechanisms for the Interactions of Radio and Microwaves
With Biological Systems**
{
Frank S. Barnes
University of Colorado
Boulder, CO
- 9:00am** **Mechanisms of Electromagnetic Field Coupling Into Biological
Systems at ELF And RF Frequencies**

James C. Lin
University of Illinois at Chicago
Chicago, IL

CARDIOVASCULAR EFFECTS OF ELF MAGNETIC FIELDS

Antonio Sastre, Ph.D.
Midwest Research Institute
425 Volker Blvd.
Kansas City, Missouri 64110

This presentation will review cardiovascular responses of healthy human volunteers exposed to ELF magnetic fields. This is an area that has received relatively little attention in the broad area of bioelectromagnetics. While early studies examined mean heart rate, which is a relatively insensitive parameter, more recent studies have focused on heart rate variability (HRV). HRV measures the autonomic nervous system's beat-to-beat control of cardiac activity. The raw data for all HRV analyses are the time series of R-R intervals from the electrocardiogram. These data can then be analyzed by spectral, time domain, or nonlinear dynamics techniques. Since the original report from Richard Cohen's lab at MIT in 1981, it has been solidly established that spectral power in the low frequency (LF) HRV band (0.04 - 0.15 Hz) reflects mainly sympathetic activity, while high frequency (HF) HRV spectral power (0.15 - 0.40 Hz) reflects parasympathetic tone. Several epidemiologic studies, especially the prospective Framingham study, have indicated that reductions in time- and frequency-domain measures of HRV balance are predictive indices of long-term cardiac morbidity and mortality in middle-aged and elderly populations. In some laboratory experiments, human volunteers showed reduced LF-HRV during exposure to magnetic fields, and in a cohort mortality study of electric utility workers, death due to acute myocardial infarction and arrhythmias, but not other forms of heart disease, were associated with measures of magnetic field exposure. This overview will discuss relevant central nervous system and cardiac ELF dosimetry which, together with the biomedical literature, establishes that alterations in HRV due to ELF magnetic field exposure are likely to result from field interactions in the central nervous system and not the heart. The overview will also discuss mechanistic hypotheses to explain links between myocardial infarctions and reduced LF HRV.

Mechanisms for the Interactions of Radio and Microwaves With Biological Systems

**Frank S. Barnes
University of Colorado Boulder**

We would like to be able to trace the effects of radio and microwave fields on ions, atoms and molecules, on through their effects on single cells to organs and larger biological systems. The best understood mechanism for interaction is heating, which, in a biological system, is highly inhomogeneous at levels ranging from whole body to cell membranes. Under the conditions of high-power pulses such as would be seen with radar transient heating of membranes, a simple model predicts that the membranes can be heated to more than ten times the average temperature of the whole cell. We will show that both the temperature and the rate of change of temperature can be important. Additionally, heating can serve as a mechanism for demodulating a time-varying RF signal if the thermal time constant lies between the carrier frequency and the modulation frequency. This, in turn, can lead to low-frequency chemical signals at the cellular level. These signals are frequently smaller than those generated by random temperature fluctuations and it is likely that they will be important only when they are coherent long enough for the biological system to interpret them. We will also present some data indicating that low-level signals can cause a biological system to respond as it would to a low-level stress. This stress can have either positive or negative effects on the immune system.

**Electric field interactions at the extracellular matrix level:
From molecular self assembly to cancer incidence**

Ken McLeod
Bioelectromagnetics Research Laboratory
SUNY Stony Brook, 11794-5281

The fundamental issue we struggle with in understanding the role of low level ELF electric field effects on living tissue is the lack of a clear mechanism of interaction. This applies to questions on the role of endogenous electrical currents in affecting normal development, repair, and adaptation, as well as to the role of exogenous fields utilized in therapy, or as potential carcinogens. Because the interior of cells are well insulated from ELF fields by the presence of the plasma lipid membrane, we have been investigating, for the last few years, electric field effects on the extracellular matrix (ECM). Field induced changes in the ECM can indirectly affect cell phenotypic expression, can have lasting impact after the field exposure is removed, and can be integrated over time, enhancing the magnitude of the cellular response with continued exposure.

To pursue the role of the ECM in mediating ELF field effects, we have developed a model of spontaneous matrix formation. Using polysulfonated polystyrene spin-coated onto silicon wafers as a substrate, we have shown that fibronectin can be coaxed to self organize into a fibrillar structure depending on the substrate charge density. The extreme non-linear dependence of this self-organizing process on the substrate charge density permits us to study the influence of various electrostatic perturbations on this process. We have been focusing on the influence of both induced charge density, as well as ferrous iron, as models of two environmental contaminants.

Both low levels of an induced charge (± 1 microCoulomb/m²) and low levels of Fe(II) or Fe(III) (0.003-3 micrograms/litre) can be shown to significantly influence fibronectin matrix formation as measured by the fractal dimension of the matrix. These measurements are made utilizing atomic force microscopy images of the formed matrix. Work in progress is addressing the differentiation response of breast epithelial cells to these perturbed matrices.

The relevance of these studies is reflected in a retrospective epidemiological study our group has recently completed. Breast cancer incidence rates were compared across water districts on Long Island which represent a wide range of free iron levels in the water supply. A significant correlation between iron levels and breast cancer risk was observed, with a 15% increase in risk being associated with a ten fold increase in iron levels.

Table 1. LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)**(A) Limits for Occupational/Controlled Exposure**

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

(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz

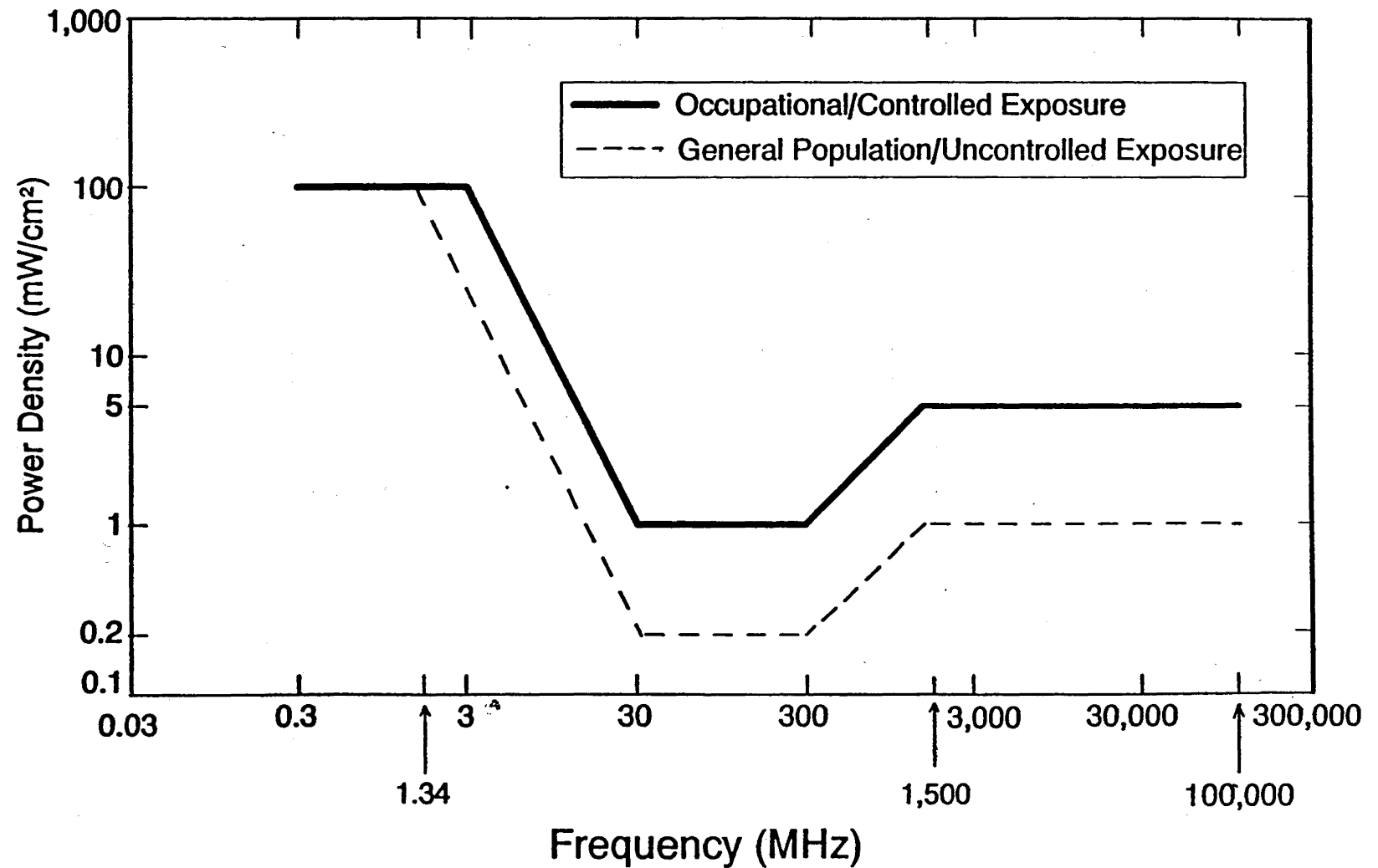
*Plane-wave equivalent power density

NOTE 1: *Occupational/controlled* limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2: *General population/uncontrolled* exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

Figure 1. FCC Limits for Maximum Permissible Exposure (MPE)

Plane-wave Equivalent Power Density



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Federal Developments Affecting Municipalities

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on

Zoning and Siting of Cellular Towers

by

John W. Pestle
and
Charles N. Ash

prepared for

Litigation and Regulation

Advocating Local Government Interests in Telecommunications

National Association of Telecommunications Officers and Advisors

June 25, 1999

Washington, D.C.

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(Updated to July 20, 1999)

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ATTORNEYS AT LAW
Federal Developments Affecting Municipalities

on
Zoning and Siting of Cellular Towers

by
John W. Pestle
and
Charles N. Ash¹

I. Introduction

A. The following is a summary of Federal matters affecting municipalities on the zoning and siting of cellular towers. Principle topics include:

1. Background information on PCS and cellular towers
2. Summary of Section 704 of Telecommunications Act of 1996 ("1996 Act").
3. Potential zoning solutions
4. FCC proceedings affecting cellular tower zoning
 - a. Zoning moratoria proceeding
 - b. RF Radiation proceeding
 - c. Broadcast tower proceeding
5. Recent Court cases on Section 704
6. Other Federal matters
 - a. Constitutionality of Section 704

¹Varnum, Riddering, Schmidt & Howlett^{LLP} represents municipalities nationwide on cable and telephone matters, from small municipalities to large cities such as Fort Worth, Chicago and Detroit. John Pestle is Co-Chairman of the firm's Energy and Telecommunications Group and is a past chair of both the Municipal Lawyers Section of the State Bar of Michigan and the Legal Section of the American Public Power Association. He received the "Member of the Year" award from NATOA in 1996 for his work assisting municipalities on the Federal Telecommunications Act of 1996 and is a graduate of Harvard College, Yale Graduate School, and the University of Michigan Law School.

Charles N. Ash is an associate with the firm who works on cable and telecommunications matters. He is a graduate of Calvin College and Stanford University Law School.

The firm has provided over 500 communities nationwide with model PCS zoning ordinances, leases and related materials, represented the National League of Cities and NATOA in reply comments in the FCC's zoning moratorium preemption proceeding and represented many municipalities in the FCC's RF radiation and broadcast tower proceedings.

b. FCC non-compliance with environmental laws

II. Background

A. Personal Communications Service (PCS) is the next major advance in cellular telephone service. Similar to cellular service, except is higher frequency, all digital.

B. The FCC auctioned off licenses for PCS service around the country. \$24 billion raised to date.

C. Major cities will likely have five or six PCS type providers in addition to the two current cellular operators.

D. PCS providers are attempting to build their systems quickly for competitive reasons and to meet the conditions of their FCC licenses.

E. Concurrently conventional cellular providers are upgrading their systems to better compete with PCS—converting to digital, installing more towers for better coverage

F. PCS providers sometimes are partnerships with local utility companies (electric utilities such as Texas Utilities) due to the advantage of using the existing entities' towers, poles, lines and access to their customers.

G. Due to the technology used, PCS requires many more "cell sites" and towers than conventional cellular telephones (one tower per cell site).

1. PCS "cells" may be ½ to 2 miles in diameter vs. 3 to 15 for conventional cellular.

2. One major venture is proposing one tower every two square miles.

H. Failure or bankruptcy of some PCS providers is a real possibility.

1. One major provider (Pocket Communications) already has filed for bankruptcy, plus some smaller providers.

2. Others may follow.

I. Tower Proliferation:

1. Towers may be 50' to 100' to 200' tall.

2. Partially due to increased number of providers

- a. Six PCS-type providers may lead to approximately three separate towers per square mile.
- b. Higher frequency of PCS as compared to older cellular service also leads to more towers.
3. Exacerbated by need for more towers to provide “in building” coverage for handheld phones—which are much lower power than older car phones, require more antennas and towers as a result.
4. Result—many more antennas and towers—probably around five times the number of towers present in 1996.
 - a. FCC estimates 120,000 new towers needed
 - b. This may be a problem in residential areas.
5. Consider means to require consolidation of towers/one joint tower in residential areas.

III. Summary of Section 704 of 1996 Act

A. Section 704 of the Federal Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (1996) (partially codified at 47 U.S.C.A. 332 (c) (7)—complete copy set forth at end of this paper), generally preserves local zoning and land use authority for PCS. The principles it sets forth largely repeat standard provisions of zoning law.

1. A complete copy of Section 704 is attached at the end of this paper.
2. Congress rejected cellular industry attempts to have the FCC preempt local zoning of cellular towers. This is important, given that the new personal communications services (PCS) will lead to 120,000 new cellular towers nationwide, with many communities having three to six different providers (with nine providers possible), each needing its own set of antennas.
 - a. In fact, in 1996 Act Congress expressly directed the FCC to terminate proceedings the FCC had started to preempt local zoning of cellular towers.
3. Municipalities cannot “unreasonably discriminate” among “providers of functionally equivalent services.”
 - a. The Committee Report accompanying Section 704 says this language gives municipalities “flexibility to treat facilities that create different visual, aesthetic, or safety

concerns differently” under generally applicable zoning requirements.

b. Different standards may apply in different districts (commercial vs residential).

c. If Provider A needs a 30 foot tower and Provider B needs a 200 foot tower the municipality may treat them differently.

4. Municipalities cannot “prohibit or have the effect of prohibiting” cellular service, so some appropriate place and conditions should be found for the antennas.

5. Municipalities must act in a reasonable time, which in general is the time frame that would typically occur under State and local law.

6. Municipalities must see that any denial of a request to “place, construct or modify” PCS devices is:

a. In writing, and

b. Supported by “substantial evidence contained in a written record,” which is a common existing standard for evidence in zoning matters.

c. There is no Federal presumption of validity on PCS requests for zoning approval.

d. The written record requirement may create concerns for situations such as denial of a building permit for a cellular tower because such a tower is not a permitted use in the zone in question.

7. Municipalities cannot deny or regulate cellular antennas due to environmental concerns about their radio emissions if the antennas comply with FCC rules on radio emissions.

B. Section 704(c) (attached at end of paper) also requires the Federal Government to make Federal lands and buildings available for cellular antennas.

1. A General Services Administration directive in Federal Register encourages PCS antenna placement on Federal property.

a. But requires compliance with local zoning rules, building codes.

b. Claims by PCS providers that their antennas on post offices are exempt from local zoning regulations are incorrect.

c. Post Office, other Federal agencies, have backed off claims that they need not comply with local zoning laws when cellular antennas are installed on Federal property—e.g.—Unisite litigation regarding antenna on post office in Schaumburg, IL.

IV. Potential Zoning Solutions²

A. By modifying the definitions in their zoning ordinances, municipalities can address cellular company claims that they are “utilities” or “essential services” entitled to preferential treatment (for example, placement of towers of right in all zoning districts) under zoning ordinances, which may impair municipal attempts to apply appropriate zoning controls to cellular towers.

B. A good means to encourage use of certain locations, such as industrial or commercial areas, is via a lessened or quicker approval process for such locations.

C. Encourage location on municipally owned properties or rights of way.

1. Minimizes intrusion.
2. Aids consolidation, collocation.
3. Revenue impact.

D. Consolidation/collocation approaches:

1. Multiple antennas on one tower where feasible.
2. Engineering considerations -- may not always be practical.
3. Some opposition by incumbent providers.
4. Aided where towers are special uses or require variances.
5. Towers with multiple antennas can be unsightly.
6. Tradeoff between having fewer, more obtrusive towers and more, less obtrusive (shorter) towers.

E. Graduated Zoning Approach

² The firm has available a 10-15 page model PCS zoning ordinance for use by municipalities for \$225. It is available on hard copy and disk. Contact John Pestle or Kim Van Dyke at 616/336-6000 for details.

1. Increased scrutiny and approval needed as land use categories become more sensitive (industrial to commercial to residential).

F. Encourage “stealth” or concealed antennas, such as:

1. In church steeples, or buildings
2. As part of outdoor signs
3. As part of electric light poles
4. Disguised as trees

G. Encourage use of cable-based “microcell PCS” which uses a cable system and no towers to provide PCS service

1. Used at 1996 Republican National Convention.
2. Used by Sprint Spectrum affiliate in San Diego area.
3. Viewed as potential significant revenue source for cable systems.
4. Require tower applicant to show why cannot use it in lieu of tower.

H. Spacing requirement -- antennas must be located a certain distance apart.

1. Prevents concentration of antennas, does not reduce their number.

I. Concerns about bankruptcy of tower owner.

J. Provisions to obtain additional information from provider to allow examination of issues that may raise in zoning proceeding.

K. Radio Emission Concerns:

1. Some PCS services cause interference with hearing aids -- major issue in some areas (e.g. San Diego). Some studies show interference with pacemakers.

a. Technological solutions in short term unclear.

2. In some areas there is significant public concern about the health effects of radio frequency emissions from PCS towers

a. The 1996 Act states that municipalities cannot regulate the “placement, construction or operation” of PCS and cellular facilities but only “to the extent such facilities comply with the FCC’s regulations concerning such emissions.”

b. FCC August, 1996 rules set standards for such emissions, but “categorically exclude” PCS and cellular antennas below certain power levels and which are located more than 10 meters above ground level (or 10 meters above a rooftop) from having to demonstrate compliance with the FCC rules.

(1) The rules are currently on appeal to the Second Circuit, with a decision likely this year.

c. The FCC does not conduct measurements of RF radiation from PCS or cellular antennas.

d. Actual measurements of RF radiation from antennas can provide a basis to address community concerns (if the antenna meets FCC requirements) and a basis for municipal action (if the antenna violates FCC requirements). Measurements by City of San Francisco showed a number of cellular antennas exceeding FCC RF radiation limits. Municipalities where radiation concerns are an issue may wish to consider:

(1) Requiring PCS providers to provide information (especially on towers with collocation) on projected radiation, whether standards for “categorical exclusion” are met, and if so why. Updated information may be needed as other providers attach to a tower.

(2) Requiring the provider (or an independent party at provider’s expense) to make periodic measurements for compliance with FCC rules.

(3) Predetermined potential actions by the municipality if the FCC radiation limits are exceeded (affect on zoning approvals, temporary cessation of service, notice to FCC, notice to nearby property owners and persons, provision of adequate insurance to cover claims).

e. Collocation with multiple antennas on one tower or building is more likely to not meet the FCC standards for “categorical exclusion” and are more likely to not meet the FCC radiation standards.

V. FCC Proceedings

A. Zoning Moratoria Proceeding.

1. Some municipalities have adopted moratoria on new towers until they could amend their zoning ordinances to deal with them.

2. In December, 1996, the cellular industry filed a petition at the FCC to have all cellular tower zoning moratoria nationwide declared illegal.

3. Municipalities claimed the FCC lacked jurisdiction over the subject matter in question and if it had jurisdiction, had not followed the appropriate procedures (proceeding municipality by municipality, as provided by statute).

4. In July, 1997, the FCC "tentatively concluded" that it should preempt all cellular tower zoning moratoria of unlimited duration and asked for comments on this conclusion and the following points:

a. What is the maximum time for a zoning moratorium which the FCC should allow (90 days, 6 months or other).

b. Whether the FCC's ruling precluding moratoria should apply prospectively or retroactively (to moratoria currently in effect).

c. Whether moratoria that affect new cellular providers while old ones construct or modify facilities should be preempted by the FCC.

d. Whether zoning moratoria that are otherwise acceptable should be ruled illegal if they are based upon concerns about radiation from cellular antennas.

5. Municipalities were concerned about this proceeding for the following reasons, among others:

a. Zoning moratoria are a permissible zoning tool and do not prevent cellular service. The FCC's proposal did not recognize this and impermissibly attempted to create a uniform maximum duration for such moratoria.

b. It violated the exclusive local zoning authority over cellular towers which Congress confirmed in the Telecommunications Act of 1996.

c. The FCC would likely use a ruling in this proceeding as a precedent to further limit local zoning authority over cellular towers, such as:

(1) Cellular companies' claims that the FCC should ban any delay in acting on a request for cellular tower zoning approvals, and

(2) Banning most zoning changes affecting cellular towers (because they affect new providers more than they affect incumbents with some towers already in place)

d. The FCC violated applicable statutory and constitutional provisions by failing to either proceed on a case by case basis (with notice to the affected municipalities) or use the rulemaking process.

(1) Use of this procedure may have substantial impact on many other FCC attempts to preempt local authority.

e. The FCC action violated principles of Federalism, where zoning is generally a matter of exclusive local concern.

f. The FCC action violated the Freedom of Speech and other rights of residents to voice their concerns about radiation from cellular towers.

6. In August, 1998, the proceeding was resolved with an agreement between the FCC's Local and State Government Advisory Committee, the cellular industry and the FCC which provides generally as follows:

a. It provides a set of suggested "best practices" by which the industry and local governments can work cooperatively on wireless tower siting.

b. It provides an informal dispute resolution process administered by the FCC for use by local governments and industry regarding moratoria or other disputes that may affect wireless tower siting. The process is voluntary and advisory.

c. The cellular industry agreed to withdraw its preemption petition with prejudice, meaning that it may not be refiled.

B. RF Radiation Proceeding.

1. The 1996 Act states it preserves local zoning of cellular towers with one exception: Municipalities cannot regulate cellular towers to the extent their radiation complies with FCC rules.

2. In August, 1997, the FCC issued a Notice of Proposed Rulemaking which would have this "exception swallow the rule" by allowing the FCC to review and reverse any local zoning decision that it concludes is "tainted" by concerns over RF radiation. The proposed rule would have the following elements, among others:

a. A cellular provider could appeal directly to the FCC any zoning decision (or failure to act) it claims is based on concerns over radio wave radiation from a cellular tower.

b. Appeals would not be from the final decision of a municipality (e.g.--board of zoning appeals) but instead would be from the initial decision (e.g.--of a zoning or planning commission).

c. FCC appeals would proceed in parallel with board of zoning appeal proceedings and any local court appeals.

d. The FCC could reverse zoning decisions if there is any evidence showing that concern over radiation was the basis (or partial basis) for the decision.

(1) The FCC stated it could reverse zoning decisions that are otherwise perfectly acceptable if radiation concerns were raised.

(2) The FCC apparently will “second-guess” the reasons given by a municipality for its decisions.

e. “Where the FCC does not have specific preemption authority” over cellular zoning decisions it would intervene in court appeals by industry providers to “provide the court with our expert opinion.”

f. The FCC suggested these rules should also apply to private restrictions affecting cellular towers, such as land trusts, conservation easements, condominium rules, homeowner association rules, subdivision restrictions and deed restrictions.

(1) In a related proceeding, the FCC is being asked to rule that it can prohibit all state court lawsuits affecting cellular towers, such that (among other things) all private land restrictions limiting the construction of cellular towers could not be enforced.

g. Municipalities could not require cellular telephone companies to measure the radiation from their antennas (to show it complies with FCC rules).

(1) The FCC rarely, if ever, conducts such measurements for certain classes of towers.

3. Municipal concerns as to this rulemaking include:

a. The FCC is using the “radiation exception” to overturn the 1996 Telecommunications Act’s preservation of local zoning authority over cellular towers because in contested cases, usually some resident will mention RF radiation.

b. The proposal violates principles of Federalism, especially by allowing the FCC to “second-guess” the reasons for local decisions and reverse decisions that are otherwise acceptable.

c. The proposed rule violates the 1996 Act’s preservation of local authority over cellular tower radiation exceeding FCC limits.

d. It infringes on citizens’ Freedom of Speech and right to petition government, particularly given that in many communities, by statute, charter or local practice, there is a public comment period where citizens may speak on agenda and non-agenda items and their comments cannot be restricted.

e. It is a “gag rule” because citizens who properly raise radiation concerns (e.g.--exceeding FCC limits) may increase the chances towers will be located near them!

f. The FCC is in a conflict of interest position because it has been directed by Congress to help balance the Federal budget by selling off airwaves for cellular service. It is giving first priority to this with health and safety of citizens getting little attention.

g. The FCC’s rationale for not measuring radiation from towers typically assumes a single tower standing by itself. Increasingly, towers are mounted on the sides of buildings or with multiple antennas “collocated” one on top of each other, such that they may interact in unanticipated ways.

(1) If the radiation is within FCC limits, why is it opposed to measuring it?

C. Broadcast Tower Proceeding

1. In August, 1997 the FCC issued a proposed rule requiring (a) states and municipalities to act on (b) all zoning, building permit, environmental permits and any other approvals (c) necessary for the construction or modification of radio and TV station towers (d) within 21 days to 45 days irrespective of (e) the subject matter of the approval, its complexity, the time needed to obtain information, local requirements for notice to adjoining landowners, hearing requirements, appeal periods and the like.

a. Failure to act in these time frames results in the permit or approval automatically being granted!

b. The FCC claims this change is needed to aid the initial construction of new towers needed for High Definition Television (HDTV), also known as digital TV (DTV). It does not explain why the proposed change should apply to AM and FM stations and continue indefinitely.

c. Some of the new digital TV towers will be nearly one-half mile high -- taller than the Sears Tower or Empire State Building.

2. In addition, under the proposed rule:

a. Zoning approval, building permits, environmental permits and code approvals could only be denied for "clearly stated safety" reasons.

b. Approvals could not be denied or conditioned due to aesthetics, impact on property values, designation as a historic site or the like.

c. Municipalities must prove that any zoning, environmental or code requirements are reasonable in light of the Federal interest in having radio/TV stations and "fair competition among electronic media."

d. All appeals of state and local decisions affecting radio and TV towers would go to the FCC in Washington, not to the local courts.

3. States and municipalities are concerned about this rulemaking for the following reasons, among others:

a. The proposed rule violates principles of Federalism which recognize zoning and permitting as being a uniquely local concern.

b. It would set a dangerous precedent for Federal agencies intruding in local affairs by mandating that state and local approvals are "automatically deemed granted" for private parties.

c. The time limits proposed by the FCC are unrealistic and bear no relation to the procedural requirements of state and local law, requirements of due process, or zoning law.

d. The proposed rule totally disregards property values, historic districts, aesthetics and the like. Even safety rules apparently can be over-ruled by non-safety "Federal interests."

e. Rather than change the artificial deadline it set for HDTV (which may not be met for other reasons) the rule puts zoning, property values, safety and Federalism at risk.

4. The FCC appears to have backed off some on this rulemaking.

a. Its experience in the top television markets (to convert to HDTV in 1998 and 1999) have not shown state and local permitting to be a problem.

b. On May 29, 1998 the FCC created a "DTV Tower Strikeforce" to target potential problems in the implementation of HDTV and to work with state and local governments to expedite its implementation.

c. Efforts to reach an amicable resolution with broadcasters have not been successful.

VI. Recent Court Cases on Section 704

A. The following is a summary of the seven Federal Court of Appeals cases to date interpreting Section 704, plus some Federal District Court and state court cases.

1. The Court of Appeals cases cover:

a. Maine, New Hampshire, Massachusetts, Rhode Island and Puerto Rico (First Circuit).

b. New York, Vermont and Connecticut (Second Circuit).

c. Pennsylvania, New Jersey and Delaware (Third Circuit).

d. Virginia, West Virginia, Maryland, North Carolina and South Carolina (Fourth Circuit).

e. Illinois, Indiana and Wisconsin (Seventh Circuit).

B. Moratoria

1. Municipalities sometimes enact moratoria on new approvals for cellular towers until they can modify their zoning or other ordinances so as to deal with the increased number of towers. Cellular and PCS companies strongly oppose such moratoria.

2. The leading case upholding moratoria is Sprint Spectrum, L.P. v. City of Medina, 924 F. Supp. 1036 (W.D. Wash. 1996) ("Medina") which upheld a six month moratorium that

was passed five days after the 1996 Act's effective date and only prohibited the local commission from issuing permits.

3. Some other courts have found that moratoria violate Section 704. See, e.g.--Lucas v. Planning Board of the Town of LaGrange, 7 F. Supp.2d 310 (S.D.N.Y. 1998); Sprint Spectrum, L.P. v. Jefferson County, 968 F. Supp. 1457 (N.D. Ala 1997) ("Jefferson County"); Sprint Spectrum, L.P. v. Town of Farmington, Civ. No. 3:97-863, 1997 WL 631104 (D. Conn. Oct. 6, 1997); Sprint Spectrum, L.P. v. Town of West Seneca, 659 N.Y.S.2d 687 (N.Y. Sup. Ct. 1997) ("West Seneca");

4. Courts that have found moratoria problematic tend to do so because moratoria controvert the provisions of Section 704 that require the municipal authority to (a) respond to requests for permission to place facilities within a reasonable amount of time, (b) deny such requests only in a written decision supported by substantial evidence contained in a written record, and (c) not enact regulations that have the effect of prohibiting the provision of wireless services. See, e.g., Jefferson County, 968 F. Supp. at 1467; West Seneca, 659 N.Y.S.2d at 688.

C. Substantial Evidence--Standard of Review

1. In accordance with federal precedent concerning judicial review of state agency decisions and Section 704, the appropriate standard of review of a municipality's decision on cellular or PCS zoning matters is whether "substantial evidence in the written record supports the authority's determination." AT&T Wireless PCS, Inc. v. Winston-Salem Zoning Board of Adjustment, 172 F.3d 307, at 313-314 (4th Cir. 1999) ("Winston-Salem"); AT&T Wireless PCS v. City Council of Virginia Beach 155 F.3d 423, 430 (4th Cir. 1998) ("Virginia Beach") A court cannot review such a decision *de novo*, and is not free to substitute its judgment for the municipal authority's judgment. *Id.* . Rather, a court must uphold the municipal authority's decision if there is substantial evidence to support it in the record as a whole, even if the court would have made a different decision. *Id.*

2. Standard U.S. Supreme Court definition of substantial evidence applies--less than a preponderance of the evidence but more than a mere scintilla, Cellular Telephone Company v. Town of Oyster Bay 166 F.3d 490 (2d Cir. 1999) ("Oyster Bay"); Sprint Spectrum v Willoth __ F. 3d __, 1999 WL 326062 (2d Cir. 1999) ("Willoth"); Virginia Beach; Aegerter v City of Delafield 174 F. 3d 886 (7th Cir, 1999) ("Aegerter"); Omnipoint v Pine Grove Township 1999 U.S. App. LEXIS 14610 at 8-9, footnote 5 (3rd Cir, 1999) ("Pine Grove Township") (citations to page numbers in slip opinion).

3. "Substantial evidence" also means "such relevant evidence as a reasonable mind might accept as adequate to support such a conclusion." Virginia Beach, (quoting Universal Camera v. NLRB, 340 U.S. 474, 488 (1951)).

4. Virginia Beach is notable because

a. It held that “substantial evidence” under Section 704 should be interpreted as what would be considered important by a reasonable legislative body, not as to what would be important to a bureaucrat.

(1) Contra, see Pine Grove Township, supra at 13 (“we apply the substantial evidence standard as we would to the decision of a federal administrative body”), Aegerter at 890.

b. Accordingly, the court held that it is “proper” and “expected” that the views of constituents should be considered by municipalities as “particularly compelling forms of evidence” in zoning and other legislative matters. “[Constituents’] views, if widely shared, will often trump those of bureaucrats or experts in the minds of reasonable legislators.” Id.

c. The court relied on “the repeated and widespread opposition of a majority of citizens” to uphold the city’s rejection of the cellular tower zoning requests, even though the cellular companies’ evidence “may even amount to a preponderance of evidence in favor of the application.”

d. The court expressly rejected the cellular companies’ claims that the “predictable barrage” by them of “exhibits, experts and evaluations . . . mandates that local governments approve [cellular tower] applications [and] effectively demand that we interpret the Act so as always to thwart average, nonexpert citizens; that is, to thwart democracy.” Virginia Beach at 431.

5. Unclear whether municipality bears burden of proof to show that it’s decision was supported by substantial evidence, but not necessary to decide issue, said court in Oyster Bay.

D. Some of Factors that May Be Considered

1. Aesthetics

a. Expressly allowed in Aegerter, Town of Amherst v Omnipoint Communications 173 F. 3d 9 (1st Cir. 1999) (“Amherst”), Pine Grove Township and Winston-Salem.

b. “A few generalized expressions of concern with ‘aesthetics’” cannot serve as substantial evidence” to support a denial. Oyster Bay, Pine Grove Township.

c. Committee Report accompanying Section 704 expressly states that aesthetics may be considered.

decision and the evidence relied upon to reach the decision. Quoting Virginia Beach, the Winston-Salem court found that “[t]he simple requirement of a decision. . . in writing cannot reasonably be inflated into a requirement of a statement of findings and conclusions, and the reasons or basis thereof.” Id. at 313 (quoting Virginia Beach, 155 F.3d at 430).

F. Unreasonable Discrimination

1. “[A]ssuming that the City Council discriminated, it did not do so ‘unreasonably,’ under any possible interpretation of that word as used in the Act. We begin by emphasizing the obvious point that the Act explicitly contemplates that some discrimination ‘among providers of functionally equivalent services is allowed. Any discrimination need only be reasonable.’ . There is no evidence that the City Council had any intent to favor one company or form of service over another. In addition, the evidence shows that opposition to the application rested on traditional bases of zoning regulation: preserving the character of the neighborhood and avoiding aesthetic blight. If such behavior is unreasonable, then nearly every denial of an application such as this will violate [Section 704], an obviously absurd result.” Virginia Beach at 427.

2. Second Circuit reached same conclusion in Willoth, *supra*, and ruled that:

a. A more probing inquiry of one provider than another is OK.

b. The location of a tower may be taken into account to approve a tower for one provider, deny for another

3. Cellular service was distinguished from paging service by the Court where the City approved towers for one service, but not the other. Aegerter, *supra*.

G. Effectively Prohibit Service

1. Fourth Circuit in Virginia Beach held that Section 704's requirement that municipalities not “prohibit or have the effect of prohibiting” cellular/PCS service only applies to “‘blanket prohibitions’ and ‘general bans or policies,’ not to individual zoning decisions.” Id. 428.

2. First and Second Circuits reached opposite result: Municipalities’ claim Section 704 only prohibits general bans (moratoria) on wireless facilities was rejected by the Courts of Appeal in Amherst and Willoth. In rejecting this claim, the Court of Appeals in Amherst was concerned about the situation where a municipal zoning authority sets out criteria that could never be met. Id. at 14. The court held as follows: “[i]f the criteria or their administration effectively preclude towers no matter what the carrier does, they may amount to a ban ‘in effect’ even though substantial evidence will almost certainly exist for denial.” Id.

2. Property Values

- a. Allowed as a factor in Aegerter and in Pine Grove Township.
- b. “Difficult questions” of expert vs lay testimony described but not decided in Oyster Bay.
- c. “[A] few generalized concerns about a potential decrease in property values, especially in light of [the plaintiff]’s contradictory expert testimony, does not seem adequate to [meet the substantial evidence test].” Oyster Bay at 496; Pine Grove Township at 14.

3. Citizen vs. Expert Testimony

- a. Citizen testimony may be considered—see discussion of Virginia Beach case, above; Pine Grove Township (citizen testimony inadequate on facts of case).

4. Number and Height of Towers

- a. Recognized as expressly reserved for municipalities in Amherst.

5. Towers in/near Historic Districts, Sites

- a. Commented on favorably by Court in Amherst.
- b. Approved as a legitimate factor in Winston-Salem.

E. Written Decision

1. Section 704 provides that “any decision by a State or local government or instrumentality thereof to deny a request to place, construct, or modify personal wireless service facilities shall be in writing and supported by substantial evidence contained in a written record.”

2. Providers argue that a “decision . . . in writing” must include findings of fact and an explanation of the decision. Courts of Appeal have rejected this claim.

3. The Courts of Appeal do not require the written decision to contain a statement of the municipal authority’s findings or rationales. Winston-Salem. In Winston-Salem and Virginia Beach the court found that merely stamping “DENIED” in the appropriate blank on the cover page of a special use permit application was sufficient to constitute a “written decision” under Section 704. Id.; Virginia Beach at 429. The courts refused to entertain the argument that the decision was insufficient because it failed to include the reasoning behind the

H. Radio Emissions

1. “The Town acknowledges that health concerns expressed by residents cannot constitute substantial evidence” due to ban in Section 704 on considering these if facility complies with FCC rules. Oyster Bay.

2. Virginia Beach court dismissed mention of health concerns by a few citizens as only “a small fraction of the overall opposition.”

3. Pine Grove Township court noted one citizen’s comments on “alleged health affects, which the [Zoning] Board may not consider,” comments did not affect court’s disposition of case.

I. Remedy if Section 704 is violated

1. Generally, courts either (1) remand to the local authority for reconsideration, or (2) issue mandatory injunctive relief, usually in the form of an order granting the improperly denied applications. Omnipoint Communications Enterprises, Inc. v. Town of Amherst, Civil No. 97-614-JD, 1998 U.S. Dist. LEXIS 21833, at *52 (D.N.H., August 21, 1998), reversed on other grounds, Amherst, 173 F.3d at 24.

a. One of the major risks for a municipality is that a violation of Section 704 will lead to the zoning application being approved, not a remand to the municipality.

2. Courts ordering the tower approved (e.g.–issuing mandamus or injunction that local permission be given) do so due to Section 704's directive to courts to decide Section 704 cases “on an expedited basis” and perceived statutory goal of expediting relief, and/or because “remand would serve no useful purpose.” See, e.g.–Oyster Bay, Pine Grove Township at 15 and cases cited therein.

3. Other courts decline to issue mandamus and remand the case to the municipality. Id. In Winston-Salem, the Fourth Circuit found that the district court erred in issuing a writ of mandamus because such an act was not authorized by the Telecommunications Act, the Federal Mandamus Statute (does not apply to state officials), the All Writs Act, and because all other avenues of relief had not been exhausted. Winston-Salem, 172 F.3d at 312 n.3.

J. State Law Claims

1. Municipalities should be careful to follow applicable state laws, which may be more restrictive in some respects than Section 704.

- a. However, the Amherst court also held that the burden for the carrier in these situations—where a single denial is alleged to have the “effect” of prohibiting the provision of personal wireless services—is a “heavy one.” Id. The carrier must show “from language or circumstances not just that this application has been rejected but that further reasonable efforts are so likely to be fruitless that it is a waste of time even to try.” Id. at 14-15.
3. And the provider’s claim that it must be allowed to build any and all towers it deems necessary to compete with other phone companies rejected by Court of Appeals in Willoth—Section 704 “does not trump all other important considerations.”
4. In addition, the Willoth court held that a municipality “may reject an application for [a tower] in an under-served area without thereby prohibiting wireless services if”
 - a. “The service gap can be filled by less intrusive means” such as
 - (1) Less sensitive sites
 - (2) Shorter towers
 - (3) Tower on existing building
 - (4) Camouflaged tower
 - (5) Use of fewer towers (if adequate for coverage)
 - b. “The holes in coverage are very limited in number or in size”, i.e.—de minimus,
 - (1) Interiors of buildings in rural area, or
 - (2) Limited number of spots or houses.
 - c. Note: Expressly contemplates municipal and court review of coverage maps and patterns.
5. Amherst—“Subject to an outer limit, such choices [between fewer higher towers and more shorter towers] are just what Congress has reserved to [municipalities].”
 - a. Unless record shows municipality would reject all proposals.
 - b. Cannot require/reject successive applications without indicating what will lead to approval

(1) “As Madison expressed it: ‘[T]he local or municipal authorities form distinct and independent portions of the supremacy, no more subject, within their respective spheres, to the general authority than the general authority is subject to them, within its own sphere.’ ” *Printz, supra*, 117 S. Ct. at 2377.

3. 1st Amendment Issues

a. These principally relate to arguments by cellular companies that any mention of RF radiation invalidates local zoning proceedings, such as a citizen mentioning RF radiation in a public hearing, even if it is disregarded by the municipality.

b. Such a position, if adopted by the courts, would infringe on citizens’ Freedom of Speech rights and right to petition government, particularly given that in many communities, by statute, charter or local practice, there is a public comment period where citizens may speak on agenda and non-agenda items and their comments cannot be restricted.

c. See discussion in description of 1st Amendment type issues in descriptions of FCC rulemakings, above.

B. Non-Compliance with Environmental Laws

1. Many environmental laws require studies or analysis of any Federal action potentially affecting the environment, or prohibit actions affecting certain categories of items (such as endangered species, bald eagles, migratory birds).

2. There has been a striking lack of compliance by the FCC, PCS and cellular companies with these laws, even though the FCC’s PCS licensing program will lead to around 120,000 new towers, and each tower has to be individually licensed.

3. Among the applicable laws are

a. The National Environmental Policy Act of 1969 Pub. L. 91-190, 83 Stat. 852 (1969) (“NEPA”), which requires environmental impact statements for Federal actions potentially affecting the environment.

(1) Note that NEPA generally applies to Federal actions affecting sites listed or eligible for listing in the National Register of Historic Places.

b. Endangered Species Act, Pub.L. 93-205, 87 Stat. 884 (1969).

c. Migratory Bird Treaty Act, 40 Stat. 755 (1918).

a. Cellular companies generally bring claims against municipalities under both state and Federal law.

2. In some states, the authority to enact moratoria may not be as clear or strong as in Medina.

3. In others, special provisions may eliminate or lessen local review of zoning applications by “utilities.”

VII. Other Federal Matters

A. Constitutionality of Section 704

1. The constitutionality of Section 704 is questionable under the First and Tenth amendments. Constitutional claims have been raised extensively in the FCC proceedings described above, less so in court cases.

2. 10th Amendment Issues

a. “The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.” U.S. Const., Amendment X.

b. Recent U.S. Supreme Court cases have interpreted the 10th Amendment in favor of municipalities and our “dual system of governance” so as to strike down Federal statutes which improperly intruded on state and local rights and authority. See, e.g.-- Gregory v. Ashcroft, 501 U.S. 452, 111 S. Ct. 2395, 2399, 115 L. Ed. 2d 410 (1991); New York v. United States, 505 U.S. 144, 112 S. Ct. 2408, 120 L. Ed. 2d 120 (1992)(invalidating Low-Level Radioactive Waste Policy Act); U.S. v. Lopez, 514 U.S. 549, 115 S. Ct. 1624, 131 L. Ed. 2d 626 (1995) (invalidating Federal Gun Free school Zones Act); Printz v. U.S., 117 S. Ct. 2365, 138 L. Ed. 2d 914 (1997) (invalidating portions of Brady Handgun Violence Prevention Act).

c. Circuit and District Court cases relying on the preceding have invalidated portions of other Federal laws.

d. In the Federalism context, and the proper spheres of local and Federal authority, the courts resist attempts by the Federal government to usurp the general police powers traditionally reserved to the states, and recognize zoning as a matter of particularly local concern, on which the Federal government is generally restricted from intruding.

Added 47 U.S.C.A. Section 332 (c)

(7) PRESERVATION OF LOCAL ZONING AUTHORITY.--

(A) GENERAL AUTHORITY.--Except as provided in this paragraph, nothing in this Act shall limit or affect the authority of a State or local government or instrumentality thereof over decisions regarding the placement, construction, and modification of personal wireless service facilities.

(B) LIMITATIONS

(i) The regulation of the placement, construction, and modification of personal wireless service facilities by any State or local government or instrumentality thereof--

(I) shall not unreasonably discriminate among providers of functionally equivalent services; and

(II) shall not prohibit or have the effect of prohibiting the provision of personal wireless services.

(ii) A State or local government or instrumentality thereof shall act on any request for authorization to place, construct, or modify personal wireless service facilities within a reasonable period of time after the request is duly filed with such government or instrumentality, taking into account the nature and scope of such request.

(iii) Any decision by a State or local government or instrumentality thereof to deny a request to place, construct, or modify personal wireless service facilities shall be in writing and supported by substantial evidence contained in a written record.

(iv) 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.

(v) Any person adversely affected by any final action or failure to act by a State or local government or any instrumentality thereof that is inconsistent with this subparagraph may, within 30 days after such action or failure to act, commence an action in any court of competent jurisdiction. The court shall hear and decide such action on an expedited basis. Any person adversely affected by an act or failure to act by a State or local government or any instrumentality thereof that is inconsistent with clause (iv) may petition the Commission for relief.

(c) DEFINITIONS.-- For purposes of this paragraph--

(i) the term "personal wireless services" means commercial mobile services, unlicensed wireless services, and common carrier wireless exchange access services;

(ii) the term "personal wireless service facilities" means facilities for the provision of personal wireless services; and

(iii) the term "unlicensed wireless service" means the offering of telecommunications services using duly authorized devices which do not require individual licenses, but does not mean the provision of direct-to-home satellite services (as defined in section 303(v)).

§704 of the Act, uncodified, states:

(b) RADIO FREQUENCY EMISSIONS.--Within 180 days after the enactment of this Act, the Commission shall complete action in ET Docket 93-62 to prescribe and make effective rules regarding the environmental effects of radio frequency emissions.

d. Bald Eagle Protection Act, 54 Stat. 250 (1940) and Golden Eagle Protection Act, Pub. L. 87-884, 76 Stat. 1246 (1962).

4. The FCC as a Federal agency, and the towers of PCS and cellular companies (as Federal licensees), are subject to these statutes.

5. Items that generally trigger the acts are items such as

a. Actions potentially having a significant effect on the environment, which includes impacts on historic sites and sites eligible to be historic sites.

b. Towers or other structures that may affect birds, their flyways and the like. There are well documented instances of major bird kills from encounters with towers at night and in unusual weather conditions. Such a kill could have a major impact on an endangered or similar species.

c. Many Federal programs, including major grants to municipalities, require review under the Endangered Species Act.

6. In implementing NEPA in the 1970's the FCC expressly recognized the potential environmental impact of towers on

a. Bird kills

b. Visual/scenic landscape blight

c. Plus construction related concerns.

7. The FCC has since retreated from compliance with the analyses and other requirements of these laws.

a. One of the few exceptions was the FCC vetoing a proposed cellular tower which would overlook the Gettysburg battlefield. It did so only after citizens in the area brought the tower and non-compliance with NEPA to the FCC's attention.

8. In an appropriate case municipalities may wish to require a PCS or cellular provider (especially one proposing a tower for a sensitive area) to demonstrate compliance with the preceding laws, or seek court redress for non-compliance.

(c) AVAILABILITY OF PROPERTY.--Within 180 days of the enactment of this Act, the President or his designee shall prescribe procedures by which Federal departments and agencies may make available on a fair, reasonable, and nondiscriminatory basis, property, rights-of-way, and easements under their control for the placement of new telecommunications services that are dependent, in whole or in part, upon the utilization of Federal spectrum rights for the transmission or reception of such services. These procedures may establish a presumption that requests for the use of property, rights-of-way, and easements by duly authorized providers should be granted absent unavoidable direct conflict with the department or agency's mission, or the current or planned use of the property, rights-of-way, and easements in question. Reasonable fees may be charged to providers of such telecommunications services for use of property, rights-of-way, and easements. The Commission shall provide technical support to States to encourage them to make property, rights-of-way, and easements under their jurisdiction available for such purposes.

Note: Much of the language helpful to municipalities on the interpretation and application of Section 704 appears in the relevant portion of the Conference Committee Report dealing with Section 704. For copies of this portion of the Committee Report, contact John Pestle or Charles Ash at 616-336-6000.

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CHRONIC FATIGUE SYNDROME - IS PROLONGED EXPOSURE TO ENVIRONMENTAL LEVEL POWERLINE FREQUENCY ELECTROMAGNETIC FIELDS A CO-FACTOR TO CONSIDER IN TREATMENT?

D. Maisch, B. Rapley, R.E. Rowland, J. Podd
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ABSTRACT

This paper outlines a brief description of the illness commonly known as Chronic Fatigue Syndrome (CFS) which is becoming increasingly common in modern westernised countries. While CFS has become somewhat of a 'catch-all' of medical symptoms, it is still commonly diagnosed by exclusion of other diseases rather than a specific, unique symptomology.

One feature of the disorders commonly termed CFS is a depressed immune system. This paper attempts to link the impaired immune function associated with CFS to possible chronic low level exposure to extremely low frequency (ELF) electromagnetic fields (EMFs). The evidence includes both *in vivo* and *in vitro* studies in both human and animal systems. In particular, the recent link between ELF EMFs, melatonin and the immune system are outlined.

The authors conclude that although the link between ELF EMFs and cellular dysfunction are far from proven, sufficient evidence exists to suggest a causal link. Lack of full scientific certainty should not be used as a reason for postponing prudent avoidance of ELF EMFs, particularly in cases where CFS has already been diagnosed.

KEY WORDS

Chronic Fatigue Syndrome; CFS; electromagnetic fields; EMF; 50 - 60 Hz; melatonin; prudent avoidance.

INTRODUCTION

With any illness characterised by chronic fatigue, such as CFS, Chronic Fatigue (CF) and Immune Dysfunction Syndrome (CFIDS), Chronic Epstein-Barr Virus (CEBV), Myalgic Encephalomyelitis (ME), and Multiple Chemical Sensitivity (MCS), the important outcome is a severely dysfunctional immune system.

Evidence that these conditions involves an immunological disorder is accumulating rapidly. Within the past few years various abnormalities have been found in the immune system of CFS patients, for example. These include alterations in the activity and cell surface structure of two important types of white blood cells: natural killer cells and T-lymphocytes. In some patients subtle changes have been found in the levels of neuroendocrine hormones in the brain. Evidence indicates that CFS is associated with, if not directly caused by, a persistent, low-level impairment of the immune system.

Irrespective of the 'trigger' of the condition, whether it be viral, an environmental factor, a genetic predisposition, stress, or a combination of these factors, any additional contributing factors which may also detrimentally affect the immune system should be identified, investigated and eliminated (or reduced) as part of the treatment.

In this regard a co-factor may be considered anything that may cause hormone disruption and biological changes at a cellular level, thus interfering with immune system function. This co-factor may not have initiated

the condition, but exposure to it may further stress an already affected immune system. As long as such a situation exists, any treatment's unlikely to have any lasting effect.

Existing evidence indicates that exposure to environmental level 50 - 60 Hz EMFs may be an immune system stressor with the potential to cause hormone disruption and changes at a cellular level. Therefore, EMF exposure should be evaluated as a potential risk factor for people suffering from disorders with the common feature of unexplained chronic fatigue.

CHRONIC FATIGUE SYNDROME (CFS)

CFS is a general label used to describe a debilitating illness, the cause of which is still unknown. CFS is also referred to as CFIDS (Chronic Fatigue and Immune Dysfunction Syndrome), CEBV (Chronic Epstein-Barr Virus), ME (Myalgic Encephalomyelitis), as well as several other designations. It is a complex illness which has been intensively studied for the past 40 years without firm conclusions as to its cause. Diagnosis is done largely by exclusion of other possible diseases.

Clinical CFS is characterised by incapacitating fatigue (experienced as exhaustion and extremely poor stamina) of at least 6 months duration, neurological problems and a constellation of symptoms that can resemble other disorders, including: mononucleosis, multiple sclerosis, fibromyalgia, AIDS-related complex (ARC), Lyme disease, post-polio syndrome and autoimmune diseases such as lupus. These symptoms tend to wax and wane but are often severely debilitating and may last for many months or years. All segments of the population (including children) are at risk, but women under the age of 45 seem to be the most susceptible. As with most diseases, CFS affects people differently. Not everybody reaches the severe end of the CFS spectrum (1).

There is a difference between CF and CFS. CF is a fairly widespread symptom in the community, whereas CFS is an unexplained debilitating fatigue of at least 6 months duration which severely reduces the level of activity. CFS is considerably less common.

In addition to persistent and extreme fatigue, usually with an abrupt onset accompanied by an 'infectious-like' illness, other CFS symptoms that have been identified include the following: substantial impairment in short-term memory and concentration, depression, sore throat, tender lymph nodes, muscle pain, multi-joint pain without joint swelling or redness, unusual headaches, unrefreshing sleep, cognitive function problems (such as spatial disorientation and impairment of speech and/or reasoning), visual disturbances (blurring, sensitivity to light, eye pain), chills and night sweats, dizziness and balance problems, sensitivity to heat and cold, irregular heartbeat, abdominal pain, diarrhoea, irritable bowel, low temperature, numbness or a burning sensation in the face or extremities, dryness of the mouth and eyes (Sicca syndrome), hearing disorders, menstrual problems including PMS and endometriosis, hypersensitivity of the skin, chest pains, rashes, allergies and sensitivities to odours (including chemicals and medications), weight changes without changes in diet, hair loss, lightheadedness, fainting, muscle twitching and seizures (2).

Research suggests that CFS results from a dysfunction of the immune system, involving a disruption of fundamental Central Nervous System (CNS) mechanisms, such as the sleep-wake cycle and the hypothalamic-pituitary-adrenal axis (3). One study found that more than a quarter of CFS patients had abnormal brain scans, and subtle changes have been found in the levels of neuroendocrine hormones (4). Other research has found electrolyte disturbances which sometimes included permanent changes in cell membranes' ability to pass electrolytes, permanent biochemical changes in mitochondrial function and disturbances of insulin and T3-thyroid hormone functions (5).

In 1989, Hickie, Lloyd and Wakefield, at the Prince Henry Hospital in Sydney, published results which show a significant reduction in the absolute number of peripheral blood lymphocytes in the total T-cell population and in two T-cell subsets as well as a significant reduction in T-cell function. They also found reduced immunoglobulin (antibody) levels (6). In a later paper, further alterations in peripheral blood T lymphocytes and impaired natural killer cell cytotoxicity were reported (7).

Based on physical and laboratory findings, many scientists believe that viruses are associated with CFS and may be directly involved in causing the syndrome. Several viruses have been studied to determine what, if any, part they play. These include enteroviruses, herpes viruses (especially human herpes virus-6, or HHV-6) and newly discovered retroviruses (8).

Originally it was thought that the EBV, a herpes virus that causes mononucleosis, was the cause of this syndrome. However, researchers now believe that EBV activation (when it exists) is a result of or a complication of CFS rather than its cause (9). To date, no virus has been conclusively shown to be an essential element of

There is one school of thought that holds that CFS is essentially a psychological disorder. This is because several of the symptoms seen in CFS patients are also seen in psychiatric illnesses, notably depression and anxiety disorders. Estimates of 28%-50% have been claimed for the occurrence of depression in CFS sufferers, while 15%-25% is the comparable rate in the general community. Depression sometimes appears before the onset of CFS. This suggests that depression might be a cause and not a consequence of the syndrome, or that depression may be the first manifestation of the illness in some patients. Sleep disorders which usually accompany depression would also exacerbate CFS, possibly through the disruption of melatonin activity. The overlap in symptoms between CFS and depression unfortunately blurs the distinction between a possible psychological or physical cause. However, in view of evidence that depression itself sometimes has a physical cause and responds best to physical treatments, there is some evidence that in CFS sufferers, depression may be a result of an active viral infection or an immunological disorder (10). It is also possible that many CFS sufferers become depressed as a consequence of the limitations placed on them by their illness (11). Research efforts are directed toward identifying and isolating the fundamental agent(s) responsible for triggering immune system disruption in persons with CFS. There are on-going studies of immunological, neurological, endocrinological and metabolic abnormalities and risk factors such as genetic predisposition, age, sex, prior illness, other viruses, environmental factors and stress. It may eventually be found that CFS is multi-factorial in origin with no single factor identifiable as the cause.

One factor that may play a role in CFS is prolonged exposure to low level 50-60 Hz EMFs. We now turn our attention to examining the known biological effects of low level ELF EMFs, particularly those concerning impairment of the immune system.

POWERLINE FREQUENCY MAGNETIC FIELDS AND THE IMMUNE SYSTEM

As an indicator of the possibility that exposure to low level 50 - 60 Hz EMFs may play a role in chronic fatigue / immune system dysfunction, we must look for evidence that human exposure to these fields may cause changes at a cellular level, such as hormone disruption and calcium ion efflux (12), which may have the potential to adversely impact on the immune system.

NCRP DRAFT REPORT GUIDELINES (1995)

The biological effects of EMFs were examined in great detail by an expert committee of the US National Council on Radiation Protection and Measurements (NCRP), a congressionally chartered organisation which was contracted by the Environmental Protection Agency (EPA) in 1983 to conduct a review of the biological effects of ELF EMFs.

Work was discontinued in 1986 due to funding cuts at the EPA, but resumed in 1991. In early 1995 the draft of the 800-page NCRP report was leaked to the New York based publication Microwave News, which published the report's findings in August 1995. The final report was supposed to be publicly available in early 1996, but has received such intense industry opposition to its findings that its final outcome remains uncertain.

The Committee's membership was described by chairman Dr. Ross Adey as "carefully selected to cover the great majority of societal interests on this scientific problem, including power industry engineers, epidemiologists, public health specialists as well as molecular and cellular biologists" (13). The draft report generally endorses a 2 mG (0.2uT) exposure limit, having immediate implications for new day care centres, schools and playgrounds, and for new transmission lines near existing housing.

A somewhat more flexible policy would be applied to new housing and offices. For existing facilities, the committee recommended a more gradual approach with stronger restrictions phased in over time if the evidence of a health risk continues to grow.

The NCRP Committee states that, "In key areas of bioelectromagnetic research, findings are sufficiently consistent and form a sufficiently coherent picture to suggest plausible connections between ELF EMF exposures and disruption of normal biological processes, in ways meriting detailed examination of potential implications in human health." (14)

From studies on humans the committee cites evidence for a link between EMFs and: 1) childhood and adult cancer, including leukemia and brain cancer; 2) teratological effects and other reproductive anomalies; 3) neuroendocrine and autonomic responses which, separately or collectively, may have pathophysiological implications; 4) neurochemical, physiological, behavioural and chronobiological responses with implications for

development of the nervous system.

From laboratory studies the committee notes that EMFs: 1) affect cell growth regulation in animal and tissue models in a manner consistent with tumour formation; 2) increase tumour incidence and decrease tumour latencies in animals; 3) alter gene transcriptional processes, the natural defence response of T-lymphocytes and other cellular processes related to the development and control of cancers; 4) affect neuroendocrine and psychosexual responses.

In relation to the effect of low level EMFs on the pineal hormone, melatonin, the Committee concluded that:

"There has been a strong focus on ELF field actions in the pineal gland, relating to effects on synthesis and secretion of the pineal hormone melatonin, and on a broad series of regulatory functions mediated by this hormone. Melatonin plays a key role in controlling the 24-hour daily biological rhythm. Disturbance of the normal diurnal melatonin rhythm is associated with altered oestrogen receptor formation in the breast, a line of experimental evidence now under study, or possible links between ELF field exposure and human breast cancer. . . Further, melatonin has general properties as a free radical scavenger, with the possibility of a preventative role in oxidative stress, recognized as a basic factor in a broad spectrum of human degenerative disorders, including coronary artery disease, Parkinson's and Alzheimer's diseases, and aging." (15)

According to the Committee, problematic sources of ELF EMFs include local electrical distribution systems as well as high voltage power transmission systems. Particular appliances, including electric blankets and video display units also rate highly as problem sources along with "various occupational environments". The committee states that the evidence points to human health hazards in everyday exposures to EMFs, particularly magnetic fields exceeding 2 mG (0.2uT) and electric fields at intensities in the range 10-100V/m (volts per metre).

"...there is an implication that a significant proportion of the world's population may be subjected to a low level of risk, but a risk factor with significant societal consequences, by reason of its pervasive nature and the serious consequences for affected individuals." (16)

MAGNETIC FIELD EXPOSURE AT THE CELLULAR LEVEL

The inter-relationships between various cellular processes, are far too complex for a thorough discussion here. However, the scientific evidence accumulated to date from cell biology, biochemistry and bioelectromagnetics gives an excellent understanding of these processes and how EMFs may possibly interact with these processes. It is important to note that laboratory findings are not necessarily fully applicable to real life situations. Cell-level experiments are intended to detect and characterise an effect in a system simpler than a multi celled organism. As such, in vitro experimental results are not affected by endogenous homeostatic [repair] mechanisms encountered in the whole organism and thus may be more sensitive to applied fields (17).

The hormone, melatonin, and the neurotransmitters, serotonin and dopamine, are neurochemical messengers that aid in central nervous system transmission, or in the case of hormones, travel throughout the body to effect cellular changes. There are believed to be more than 100 transmitters and hormones that allow a complex interaction among the CNS, the endocrine system, and the immune system.

The cell membrane, where transmitters and hormones bind or cross into the cytoplasm, is the likely site of any interaction with external man-made EMFs. There are receptor sites both on the cell membrane and inside the cell to which these chemical messengers bind, starting a cascade of chemical events that may eventually alter the cell's behaviour in one of many ways.

An apt description of the cellular communication process was given by Dr W. Ross Adey, the former Associate Chief of Staff for Research and Development at the Pettis Memorial VA Medical Centre at Loma Linda, California, and NCRP committee chairman:

"It is generally agreed that the first detection of ELF and ELF-modulated RF/microwave fields occurs on the membranes that enclose all cells. These complex cell membranes act as detectors, amplifiers, and couplers of weak surface electrical and chemical signals to the cell's interior. Cells also communicate with neighbours by outward signals, faintly "whispering together" electrically and chemically, through signals that are also sensitive to imposed EMFs." (18)

It is not necessary for external EMFs to penetrate into the cell interior in order to cause changes inside the cell, as reported by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) in 1996:

"By influencing signal transduction pathways, which in turn can regulate cell proliferation, cell differentiation, and even transformation to cancer phenotype, ELF-EMFs can potentially be involved in a host of disease processes without ever penetrating the cell membrane in any significant manner." (19)

In summary, EMFs can bring about fundamental changes in both electrical and chemical signalling in the CNS. One chemical messenger that has been shown to be particularly susceptible to the influence of weak ELF EMFs is melatonin.

MELATONIN

Both human and animal circadian rhythms are synchronised with the natural day/night cycle. The major control gland over this natural cycle is the pineal gland which secretes the neurohormone, melatonin. In mammals, light falling on the eye's retina during the day, produces signals which are biochemically amplified to stimulate the pineal gland to reduce its melatonin output. At night the absence of light allows the pineal gland to produce melatonin. Melatonin directly enters the bloodstream through which it has access to every cell in the body, passing directly to receptors in the nucleus (20).

In the cell nucleus, melatonin plays a role in regulating gene expression. The ability of melatonin to enter all cells is essential for one of its other important functions, which is to act as a scavenger of highly toxic oxygen-based free radicals. The production of these free radicals is a consequence of the utilisation of oxygen by all aerobic organisms. About 1 - 2% of inspired oxygen ends up as toxic free radicals, a by-product of the respiration cycle. These oxygen radicals can damage macromolecules such as DNA, proteins and lipids. This damage is referred to as oxidative stress (21).

Because of its ability to eliminate free radicals, melatonin is regarded as an efficient cell protection and oncostatic agent. At night the increasing level of melatonin helps eliminate the build up of free radicals thereby allowing DNA synthesis and cell division to occur with a far lower chance of damage. Melatonin also inhibits the release of oestrogen, prolonged exposure to which may increase the risk of breast cancer (22).

According to Brzezinski, melatonin may enhance the immune system and counteract stress-induced immunosuppression by augmenting the immune response (23).

THE MELATONIN HYPOTHESIS

In 1987 Stephens et al. suggested that EMFs reduce melatonin production by the pineal gland and that melatonin suppresses the development of breast cancer (24). They proposed that EMFs may operate as a co-factor in the development of some cases of this type of cancer. Since then, results from five in vitro studies, conducted in three major laboratories, using human breast cancer cell cultures, have shown that low level powerline frequency magnetic fields in the order of 12 mG (1.2 uT) can block melatonin's ability to suppress breast cancer cells (25). This is known as the melatonin hypothesis. In addition, several human exposure studies have found lowered levels of melatonin in people exposed to EMFs. (Section 2.3)

At the Second World Congress for Electricity and Magnetism in Biology and Medicine, held in Bologna, Italy, in June of 1997, the program bulletin states that:

"A number of experimental studies have been conducted to test the [melatonin] hypothesis. Although the literature is still evolving and consensus is being built, it is fair to say, a) there exists credible scientific support for the hypothesis and, importantly, b) this support encompasses in vitro, in vivo, and epidemiological research. The melatonin hypothesis, thus, currently represents one of the more well documented / tested interactions in the field of bioelectromagnetics." (26)

In 1988 Liburdy reported that "The melatonin hypothesis invokes a general mechanism that has relevance to all hormone-dependent tissue responsive to oestrogen and/or prolactin, such as human mammary epithelial tissue, ovarian tissue and prostate tissue" (27).

A further study found that office-place EMF exposure was apparently related not only to a decrease in melatonin levels but also to an increase in the level of the stress hormone adrenocorticotrophic hormone (ACTH) (28). The implications for CFS are obvious, for chronically high levels of ACTH are known to suppress immune function.

While the evidence for a link between ELF EMFs and melatonin is strong, other chemicals are known to be affected too. One of these is calcium ions which are critical for the proper functioning of all cells.

CALCIUM IONS, PROTEIN KINASES AND ORNITHINE DECARBOXYLASE

In their comprehensive review of the effects of EMFs on molecules and cells, Goodman et al. note that the EMF effect on calcium flux has been the subject of intense scrutiny because of the important physiological role of calcium and its relationship to membrane changes. The results are equivocal, but most in vitro experiments performed on human tissues show enhanced calcium flux in response to radio-frequency and ELF fields. Liburdy and his colleagues in particular have examined the effectiveness of the magnetic or electric field component in altering calcium flux and their combined data strongly supports the conclusion that the electric field component is responsible for altered calcium flux. They suggest that the electric field operates by inducing an opening of the calcium channel in the membrane rather than by increasing calcium mobilisation from the endoplasmic reticulum (29).

The possible connection between EMFs, calcium ions and immune system function was summarised by Cherry:

"ELF and RF/MW, modulated at ELF frequencies, change the oscillation frequency and amplitude [of calcium ion signalling] and change the influx and efflux of calcium ions in and around the cell membrane. The changing oscillation frequency and amplitude is related to the immune response of the cell and shows that the oscillating applied field produces an antibody-like reaction as though the cell has been attacked. The influx and efflux changes relate to the signal transduction pathway in which calcium ions participate. This is one of the biochemical pathways which regulate cell behaviour. This is altered by the applied oscillating electromagnetic field. Since signal transduction controls cell division, cell differentiation and cell proliferation, this EMR-induced alteration to signal transduction has the strong potential to participate in tumour formation or promotion. Alteration of T-lymphocytes and other immune system factors suggests that EMR exposure causes immunosuppression, partially through induced calcium ion efflux" (30).

Changes in cellular calcium flow are known to stimulate a group of enzymes called protein kinases, which play an important role in regulating several cellular functions. Two recent studies found evidence that inside cells, EMFs can activate certain signalling pathways, for example, protein kinase activity has been associated with cancer. Specifically these research groups discovered that the products of a particular class of oncogenes, Src tyrosine kinases, are rapidly activated by EMF exposure. The functions of other key cellular elements facilitating the cancer-promoting function of these tyrosine kinases also seem to be amplified five- to ten-fold. In addition, the results of these studies demonstrate that EMFs may alter biochemical events in the immune system that determine our susceptibility to infections (31).

It has been reported by Uckun that EMFs can disrupt the "growth regulatory balance" in cancer cells (32). Uckun also reports similar EMF-induced activity in a different, but related, enzyme system where it was found that cells exposed for 5 to 15 minutes to EMFs similar in strength to those found in electric razors (1000 mG / 100uT) caused a 5 to 10-fold increase in the activity of a gene associated with the formation of leukemia (33). Referring to this research, Adey states that, "This is another piece of evidence, which we first began to see in the 1980s, pointing to the importance of protein kinases as a key intracellular communication system that is sensitive to both ELF and modulated RF fields" (34). The possibility exists that the immune system is compromised by external EMFs which may alter chemical messengers, resulting in erroneous instructions being sent to internal cellular regulation systems.

Uckun found that elevated activation of the enzyme tyrosine kinase by EMFs may represent the initial manifestation of EMFs' biological influence, leading to a cascade of biological events. He also reported the activation of a second tyrosine kinase, known as BTK, "Because you don't have any hormone production without activation of tyrosine, the new findings may also explain provocative hormonal perturbations linked to EMF exposures" (35).

Another important enzyme involved with cell growth is ornithine decarboxylase (ODC), which is required for DNA replication. ODC is always present during cell growth and plays a critical role in cell transformation, but increased levels are considered a marker for the type of cell activity connected with cancer growth. Research by Litovitz et al. into ODC activity has shown that at the applied frequencies of 55 and 65 Hz, there is a significant (two fold) increase in ODC activity in L929 cells exposed to a magnetic field of 100 mG (10 uT). The authors conclude that "modification of its [ODC] enhancement by an applied field is of general interest for questions of EMF exposure. We suggest, however, that the coherence phenomenon noted in these experiments is likely of more widespread consequence, and that other biological responses with demonstrated EMF sensitivity will display comparable coherence dependence." (36).

The evidence we have so far reviewed would suggest a link between EMFs and calcium levels, melatonin levels, protein kinase and ODC activity. Thus it is not unreasonable to conclude that CFS, which may be an indicator

of metabolic disruption, is partly a manifestation of exposure to low level EMFs.

HUMAN EXPERIMENTAL FIELD STUDIES AND HORMONE DISRUPTION

In the previous section we note the possible link between EMFs and melatonin flux. A preliminary study in 1997 of 60 workers at a Finnish garment factory found "a highly significant effect" of EMFs in reducing nocturnal melatonin levels. Magnetic field (MF) measurements were taken for the two types of machines used in the factory and operators were assigned to high or low exposure groups, based on the type of machine they were using, with average exposures either above or below 10 mG (1.0uT). Non industrial workers who were not exposed to MFs were the controls. The results of this study found strong effects of both magnetic field exposure on night time levels of melatonin. No difference was found in melatonin levels on week nights and Sunday nights, indicating "that the possible suppression caused by magnetic field exposure is chronic, with little recovery during the weekend" (37).

A 1996 study of 192 electric utility workers by Reif and Burch found that some EMF exposures are associated with low levels of melatonin. They found a significant association between MF exposures and lower daytime melatonin levels on the second and third of three days of measurement (38). The lack of an effect on the first day (following a weekend or equivalent) may indicate a cumulative effect of exposure. Some studies have suggested that EMF effects on melatonin may depend on whether the field is continuous or intermittent. Reif and Burch found that magnetic fields in the home that were "temporally coherent" (less intermittent) had a very significant association with lower melatonin levels at night. They concluded that the intensity and temporal characteristics of MFs may both play a role in the suppression of melatonin (39).

Visual display units (VDUs) have also been implicated as a significant source of MF radiation. According to Arnetz and Berg, office workers who used VDUs had a significant reduction in circulating levels of melatonin over the course of a working day. No such change was found during days at the office with no VDU use. Levels of the stress hormone, ACTH, increased during the working day and this showed a strong correlation with workers' subjective assessment of mental strain, but in contrast, mental strain did not significantly correlate with melatonin levels (40).

Davis (Fred Hutchinson Cancer Centre in Seattle Washington), found that low-level MFs can reduce the nocturnal release of melatonin in women. While the effect was small, it occurred at milliGauss levels and followed a dose-response trend. Davis called the findings "intriguing" given the "very low level of exposure" which reflects "real-world" conditions, but cautioned that the biological significance of the results is not known at this time. Davis stated, "This is the first time we are seeing evidence that relatively small changes in magnetic fields at night can be associated with decreases in melatonin levels that night among humans living in a normal environment" (41). Davis argues that melatonin inhibits the production of other hormones such as oestrogen. Thus a drop in melatonin has the potential to cause other hormones to surge (42).

As with the laboratory research these human field exposure studies indicate a possible link between EMFs and hormone disruption which may be a co-factor in the development of CFS. The link has not been firmly established but further investigation is certainly warranted.

DEPRESSION AND EMF EXPOSURE

Research in the United States and Britain has found clinical depression to be the major factor in suicides in both countries. There are many types of depression, from seasonal depression (Seasonal Affective Disorder) which normally occurs in the winter months to low level chronic depression that may linger for months or years. Among the symptoms of clinical depression are weight loss, early waking, diminished sex drive and a general feeling of hopelessness. On the contrary, some people have what is called atypical depression which is characterised by weight gain and spending much of the day asleep.

In 1978, Perry published the findings of an EMF survey which examined the addresses of some 600 suicides reported in the Birmingham U.K. area and found that in homes where the magnetic field was above 1 mG (0.1 uT) the relative risk of depressive illness was elevated (43). Perry and Pearl conducted a study of 43 high-rise blocks with over 3,000 housing units (a total of approximately 6,000 occupants). The aim of the research was to determine whether there was any correlation between occupants' level of depression and their proximity to EMFs. Participants suffering from certain types of heart disease and from depression were more likely to be living near the main electrical supply cables in the apartment blocks. Magnetic field strengths measured in all 43 blocks with a single rising cable showed significantly higher magnetic field exposures in the apartments 'near' the cable. These fields averaged 3.15 mG (0.315 uT) nearest the cable and 1.61 mG (0.16 uT) in the 'distant' apartments. A further finding was that if only those blocks with under floor or storage electric heating were considered, the proportion of cases of depression in occupants living in apartments categorised as 'near' the

rising cable rose to 82% (44)

Changes in serotonin levels are known to be associated with depression. For example, lowered levels of this chemical in the brain have been linked to an increase in suicide frequency (45). Wolpaw examined the brain functions of monkeys exposed to 60 Hz magnetic fields. He measured the levels of neurohormones in the spinal fluid of monkeys thus exposed for three weeks. It was found that the levels of serotonin and dopamine were significantly depressed immediately following exposure, and that only the dopamine returned to normal levels several months after (46).

Low nighttime melatonin concentrations have been reported in patients with depression, and patients with Seasonal Affective Disorder have phase-delayed melatonin secretion (47).

Robert Becker, a leading researcher on EMF exposure and depression, summarises his own work, and that of others as follows:

"It seems that there may be two types of clinical depression: one that is produced by simple psychosocial factors, and one that is produced by some external factor that influences the production of these psychoactive chemicals by the pineal gland. In view of the known relationship between the pineal gland and magnetic fields, it is advisable that the search for the responsible factor include an evaluation of the effect of abnormal electromagnetic fields " (48).

OTHER RELEVANT RESEARCH FINDINGS

Since 1979 when, in a seminal paper, Wertheimer and Leeper first reported a correlation between exposure to power line MFs and childhood leukemia, there have been well over 30 major epidemiological studies examining the EMF / cancer question. Few studies, however, have looked for evidence of association between environmental power-frequency magnetic field exposure and immune-related illnesses in humans.

In one notable study, Beale et al. examined eight immune-related and chronic illnesses (variables) in a group of 560 adults living near extra high voltage transmission lines in Auckland New Zealand. Using a cross-sectional design to examine the dose-response relationship between MF exposure of adults in their homes and prevalence of these illnesses, five of the eight health variables showed a linear dose-response relationship with exposure. After adjustment for possible confounding, significantly elevated odds ratios were obtained both for asthma and combined chronic illnesses at higher exposure levels. As reported in the paper abstract, "The results are consistent with a possible adverse effect of environmental magnetic field exposure on immune-related and other illnesses" (49).

Human peripheral blood lymphocyte activity may be affected by exposure to electric fields. For example, Coghill et al. (1998), exposed human peripheral blood lymphocytes in mu-metal- enclosed (EMF shielded) cultures to the donor's own endogenous electric field overnight and tested for viability by trypan blue exclusion. This showed a 70% viability. The controls (no endogenous electric field) and sham-exposed (same gold wire feed, but unattached to body) both showed about 50% viability. When they fed a 50 Hz electric field into the lymphocyte cultures (same power density, same period of exposure, same temperature, etc.) the viability fell to 40%. This study suggests that 50 Hz electric fields (not magnetic) adversely affect human peripheral blood lymphocytes (50). A decrease in human peripheral blood lymphocytes could be implicated in the development of CFS.

A 1998 study by Bonhomme-Faivre et al. found "evidence that chronic human exposure to environmental low frequency EMFs ... can cause neurovegetative, hematological and immunological disorders". Specifically they found that a group of workers who were exposed to MFs ranging from 0.9 mG (0.09 uT) to 66 mG (6.6 uT) had significantly lower lymphocyte counts than a similar control group not exposed to these levels. The exposed group also reported significantly more occurrence of subjective conditions - mental and physical fatigue, depression, melancholy, irritability, fainting and diminished libido - than did the control group. Of particular interest with this study were two workers who had exposures from 3 mG to 66 mG (0.3 uT to 6.6 uT) and worked full-time above transformers. Both were found to have depressed lymphocyte levels which quickly returned to normal when they stopped working in that area (51).

Finally it can be noted that not all researchers agree that environmental-level 50-60 Hz EMFs are causally related to hormone disruption and changes at the cellular level. This group support the assumption that the small electric fields and currents induced in the body's tissues from external EMFs are smaller in magnitude than both internally produced fields and even the thermal noise of liquid phase solutions. This assumption has been

challenged by Gandhi who has found evidence that the fields induced in the human body by power lines and appliances, essentially all significant artificial EMF sources - are much larger than the fields generated naturally inside the body. Gandhi used a computer model to calculate the electric and magnetic fields in the 41 - 70 Hertz frequency band from internal and external sources. He found that even the largest natural fields generated by the heart are hundreds of times smaller than those induced by standing under a high-voltage line or by using a hair dryer. Gandhi stated "My assumption was that what is already in the body is pretty substantial, but that turns out to be incorrect, . . . It is time for people to reject false assumptions" (52).

The work of Gandhi and others has led the current authors to examine mechanisms which might offer some explanation of how weak environmental EMFs might affect living systems. One possible mechanism which is now gaining popular support among biologists is stochastic resonance (53). This novel application of stochastic resonance theory to biological systems is currently being explored in the authors' laboratories.

CONCLUSIONS

With the illness loosely termed Chronic Fatigue Syndrome, regardless of the cause, or causes, the primary outcome is an immune system which is markedly compromised. Considering this, it is advisable for medical practitioners working with CFS patients to advise them to avoid situations that may place an additional stress on their immune systems.

Current scientific evidence indicates that prolonged exposure to EMFs, at levels that can be encountered in the environment, may affect immune system function by affecting biological processes in ways similar to that seen with CFS. Considering the increasing incidence of CFS in the community, it is the opinion of the authors that medical practitioners should advise patients about the prudent avoidance of EMFs. It is usually a relatively simple matter to locate sources of EMF and generally to avoid them. The lack of full scientific certainty should not be used as a reason for postponing measures to prevent exposure to any potentially harmful source. If measures generally reducing EMF exposure can be taken at reasonable expense and with reasonable consequences in all other respects, every effort should be made to reduce exposure to the lowest possible level.

Glossary

Bioelectromagnetics:

An emerging science which focusses on how living organisms interact with electromagnetic fields (ELFs)

Electromagnetic Field (EMF):

Form of energy which consists of two oscillating forces (said to be at right angles to each other), an electric component and a magnetic component. Examples of electromagnetic energy include: powerline fields, radio waves; light; x-rays; gamma rays, etc.

Electric Field:

Region of space in which forces are exerted between electrically charged particles (e.g. electrons). Wherever there is a voltage potential there is an associated electric field

Extremely Low Frequency (ELF):

Electromagnetic energy where the frequency of oscillation of the energy lie in the region of 1 to 300 Hertz (Hz).

Epidemiology:

The study of disease in the population, defining its incidence and prevalence, examining the role of external influences such as infection, diet or toxic substances and examining appropriate preventative or curative measures.

Gauss (G):

CGS unit of magnetic field density [flux density], (equal to 1 Maxwell per cm⁻²). Named after the German mathematician Karl Friedrich Gauss (1777-1855). Commonly replaced by the newer unit: Tesla. For ELF magnetic field levels commonly encountered in the urban environment, the unit of **milliGauss (mG)** is normally used. 1 mG equals 0.1 microTesla (uT).

Hertz (Hz):

Unit of frequency indicating the number of cycles per second. Named after the German physicist who discovered radio waves, Heinrich Hertz (1857-1894).

in vitro :

Literally "in glass". Refers to experiments on cells and tissues which are performed in a test tube or petri dish.

in vivo :

Literally "in life". Refers to experiments that take place with or in living organisms.

Magnetic field (MF):

The area of force which exists around a moving charge, e.g. an electron. Electrons flowing through a conductor (e.g. wire) produce a force in the area surrounding the conductor referred to as a magnetic field.

RF/MW:

Radio Frequency / MicroWave. That part of the electromagnetic spectrum with a frequency in the range 100 kilohertz (kHz) to 300 gigahertz (GHz).

Tesla (T):

MKS unit of magnetic field density [flux density], (equal to 1 weber per m²). Alternatively, the magnetic induction for which the maximum force it produces on a current of unit strength is 1 newton. Named after the Croatian-American physicist and electrical engineer, Nikola Tesla (1856-1943) who pioneered alternating current and invented the a.c. induction motor and Tesla coil. For ELF magnetic field levels commonly encountered in the urban environment, the unit of **microTesla (uT)** is normally used.

CAVEAT

The authors wish to express the strong view that they do not support nor condone the use of any unscientifically proven devices that claim to cleanse or protect the body from EMFs.

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The Washington Times March 17, 2001 p. A-5

ITALY

Rome's ecology minister cites papal radio hazard

ROME (Reuters) - An Italian minister yesterday threatened to shut down the pope's radio station in an unprecedented ecological battle between Rome and the Vatican.

Vatican Radio, which has been charged with producing excessive electromagnetic levels, said it was "astonished" by the threat, which would effectively pull the plug on the station that broadcasts Pope John Paul II's words around the world.

But Italian Environmental Minister Willer Bordon gave the papal state two weeks to comply with the toughest laws in Europe on electromagnetic emissions.

"If within 15 days the broadcaster does not get back down under the limits, I will order the national electricity provider to suspend supply to the transmission centers," Mr. Bordon said at a news conference.

"If the supplier continued to provide electricity, it too would be held responsible for committing a crime," he added.

Vatican Radio broadcasts the pope's speeches and events to the world in about 40 languages from a huge forest of antennas north of Rome, an area, where some groups have reported abnormally high levels of cancer.

The transmission center, like Vatican City itself in the center of Rome, is on extraterritorial land and considered part of a sovereign state.

Mr. Bordon said the National Agency for the Protection of the Environment had detected three times Italy's legal limit of electromagnetism during one of Vatican Radio's evening broadcasts.

The Times of India May 14, 2000

<http://timesofindia.com/140500/14hlth12.htm>

Vatican radio, a health risk

CESANO, Italy: When a routine blood test revealed their 20-month-old daughter Flavia was suffering from leukaemia, Augusto Rossi and Maria Angelone believed fate was to blame.

"Our life became an inferno. We spent so much time in hospital we hardly had enough spare time to breathe," recalled Flavia's mother. "We thought it was one of those tragedies that can happen to anyone," said Flavia's father.

"But when I got to the hospital I met a lot of people with the same disease as Flavia's. A 12-year-old boy died of leukaemia shortly after Flavia was hospitalised. They all lived near my house and near those deadly antennas. I understood there had to be a connection."

The forest of antennae Rossi referred to belong to Vatican radio, which broadcasts in more than 30 languages by medium and short range to 80 million listeners.

The radio station uses one of the most powerful transmission systems in the world via 120-metre-tall directional antennas to reach the most disparate corners of the world. The transmission centre is situated 18 kms north of Rome, less than 2,000 metres away from Flavia's home in Cesano, a northern suburb of Rome. Residents have long complained that Vatican radio programmes interfere with their telephones and intercom system. They say it can even be heard through their washing machines and radiators.

After numerous appeals from residents, Rome magistrate Gianfranco Amendola has launched an official investigation into claims that the radio complex may be responsible for electromagnetic pollution. Three Vatican officials are reported to be under investigation.

Although there is no scientific proof that Vatican radio transmissions may be responsible for Flavia's illness, a growing volume of research is heightening concern that electromagnetic pollution may be negatively impacting the health and well being of millions.

A separate inquiry by the Lazio region found that electromagnetic energy near Flavia's house was almost three times the legal limit. An epidemiological study found a "higher death rate from leukaemia for men living within four kms of the Vatican radio station."

Carlo Santi, a local doctor, investigated 7,500 deaths over six years in the Cesano area and found the incidence of tumours was 30 per cent higher than the national average.

In a recent interview to the Rome-based Il Messaggero newspaper, Vatican radio director general Pasquale Borgomeo, a priest, dismissed the residents' claims as "an artificially induced psychosis." Father Borgomeo's interview produced furious reactions among local residents.

"Instead of acting as the defender of poor people, the Vatican is behaving like a multinational intent on defending its own interests," his wife added.

With appeals to politicians having so far failed, residents are now discussing with lawyers how best to take the Vatican to court.

In the meantime, they have announced they will boycott voluntary contributions to the Holy See and have appealed directly to Pope John Paul II.

(DPA)

Towers and Historic Preservation agreement (Communications Daily 3/19/01)

Advisory Council on Historic Preservation (ACHP) signed agreement at meeting in Little Rock Fri. designed to streamline communications tower colocation reviews. Agreement was crafted by FCC, ACHP and National Conference of State Historic Preservation Officers. Pact eases review procedures for collocating antennas on existing towers under Sec. 106 of National Historic Preservation Act (NHPA). State and tribal historic preservation officers had discussed procedural changes with communications industry following flood of new applications as result of recent growth in wireless communications towers. Wireless industry had sought changes as way to help relieve administrative backlogs that were delaying tower construction. Agreement is product of 7 months of industry and federal, state and tribal govt. negotiations. Under pact, most colocations on existing towers will be exempt from ACHP siting review procedures. Sec. 106 requires federal agencies to consider effects of their undertakings on historic properties. Agreement acknowledges that effect on historic properties of antenna colocations on towers is "likely to be minimal and not adverse." FCC said Fri. that national agreement was designed to relieve "unnecessary administrative burdens" on agency licensees, tower companies, state historic preservation officers and Commission "while protecting the goals of the NHPA." Agreement allows antenna to be mounted on tower built on or before March 16, 2001, unless it: (1) Will increase substantially in size, based on factors such as raising height by more than 10%. (2) Has been determined by FCC to have impact on one or more historic properties unless there's "no adverse effect" finding. (3) Is under pending environmental review or FCC proceeding involving Sec. 106 compliance. Additional caveat includes cases where licensee or tower owner has received notification that FCC has received complaint about adverse effect. Colocation on towers constructed after March 16 also is covered with similar caveats. "This agreement provides for flexibility now for carriers and tower companies to move forward," PCIA Senior Vp-Govt. Relations Robert Hoggarth said. "The fundamental advantage of this agreement is simply that it allows historical preservation officials to focus on the small percentage of towers that do have an impact." FCC signed off on agreement last week after it had allowed additional time earlier this year for comments on draft from tribal representatives. "Tribal concerns need to be addressed in this process," Hoggarth said. "The programmatic agreement is the beginning as opposed to the end," he said, noting PCIA was meeting with representatives of southern and eastern tribes today (Mon.) to begin identifying model siting agreement. Still, FCC Comr. Tristani expressed concerns that agreement fell

short of agency's commitment to facilitate tribal consultation in agency regulatory processes. Commission received nearly 20 comments from tribal govts. on draft, she said. "The overwhelming majority told us our approach is not working," Tristani said. "This response is prima facie evidence that our understanding of tribal consultation is misguided." -- MG

**LOCAL
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GUIDE**



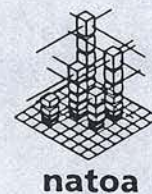
Siting Cellular Towers

What You Need To Know
What You Need To Do

**LOCAL
OFFICIALS
GUIDE**

Siting Cellular Towers

What You Need To Know
What You Need To Do



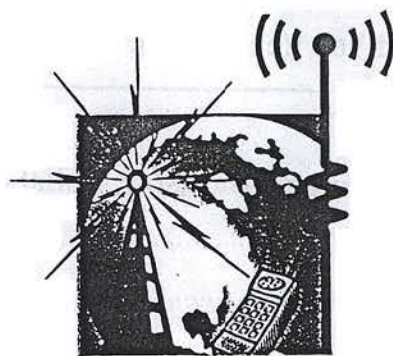


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PREFACE

A year ago, President Clinton signed the Telecommunications Act of 1996, legislation that restructured and deregulated most aspects of our nation's communications industry. Since that time, local governments have confronted many new opportunities and challenges.

Telecommunications deregulation has created a marketplace filled with new, more efficient technologies – technologies that could encourage economic development in cities and counties by creating jobs and helping local businesses stay competitive. At the same time, the influx of new telecommunications providers poses significant challenges for local governments as they perform traditional zoning and land use responsibilities.

One of the key dilemmas facing local officials is how to address the tremendous growth of cellular and personal communications service technologies. The wireless industry has spent billions of dollars to buy licenses auctioned by the Federal government. These communications providers are anxious to build networks quickly to obtain a competitive edge and see an early return on investment. As the use of wireless technology becomes more prevalent, local officials must be prepared to play a leadership role in defining land use, zoning,

and service policies to ensure that community needs are considered and protected.

With these challenges in mind, our national organizations joined together to prepare this guidebook on the siting of cellular antennas and towers for our members – city and county elected officials, local government telecommunications officers, city and county managers, and professional planners.

The guidebook provides an overview of provisions in the Telecommunications Act of 1996 that govern the siting of cellular towers in cities and counties. It offers examples of city and county ordinances that are effectively regulating the placement of cellular antennas and towers. It also provides models of successful collaboration among local governments, citizens, and industry – models that encourage the use of new technology and protect the safety and aesthetics of the community at the same time.

We hope this guidebook will help prepare your locality to deal more effectively with the complex issues involved in tower siting.

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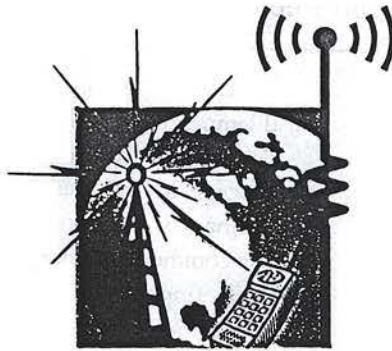
ACKNOWLEDGMENTS

The preparation and production of this guidebook was coordinated by Barrie Tabin, NLC Senior Legislative Counsel. Special thanks are due to the guidebook's primary authors: Markie Byers, NACo Research Director; Anthony Crowell, NACo Municipal Law and Policy Analyst; Karen Graham, NACo Government Affairs Specialist; Eileen Huggard, NACo Executive Director; Costis Torgas, PTI President; and Tabin.

Other staff members who contributed their time and expertise to this project include APA Research Associate Michelle Gregory and APA Policy Coordinator Peter Hawley; NLC Public Affairs Director Jeff Fletcher, NLC Policy and Federal Relations Director Frank Shafroth, and NLC Graphic Artist Susan Teetz; and PTI Business Manager Dale Bowen.

All photographs provided courtesy of FWT, Inc., of Fort Worth, Texas (1-800-433-1816.) With more than 12,000 installations in the U.S. and abroad, FWT is one of the world's largest manufacturers of towers, monopoles and tower-related equipment.





INTRODUCTION

When President Clinton signed the Telecommunications Act of 1996 into law, the nation's telecommunications policy path was clearly marked. The Act firmly established competition among multiple service providers – not monopoly control – as the course for the future.

For local governments, the law's impacts will be considerable. The entry of multiple telecommunications providers into the market with new, more efficient technologies and services can strengthen local economies by creating jobs and keeping local businesses competitive. The law also could produce new educational and health benefits for communities, create potential new revenue sources for local budgets, and permit cities and counties to deliver services in new, efficient, and innovative ways. In addition, advancements in technology – along with properly-structured and implemented public policies – can help ensure that all citizens have equitable access to essential communications services.

Clearly, the development of the local telecommunications infrastructure will be high on the list of planning priorities for cities and counties as the 21st century approaches.

The influx of new telecommunications providers also poses significant challenges for local governments as they perform their traditional zoning and land use functions. In particular, the tremendous growth in the personal wireless services market – including cellular telephones, personal communications systems, and paging services – has caused the demand for new facilities to site antennas to grow rapidly.

The construction of transmitting and receiving antennas, usually placed on towers, is essential for the effective operation of wireless services. And the growth in the number of providers of other telecommunications services, which often rely heavily on the use of streets and other public rights-of-way to offer their services, places considerable new demands – both financial and managerial – on local governments.

In today's information age, investing in local infrastructure means not only encouraging and facilitating the use of new telecommunications networks, but also managing their integration into the existing infrastructure.

Congress recognized these local responsibilities in the 1996 Telecommunications Act. The Act generally preserves local government authority to manage the use of public rights-of-way and, with respect to cellular and other wireless services, to enforce zoning requirements that protect public safety, public and private property, and community aesthetics. To comply with the law and balance community needs, however, local officials must reassess the ways in which they make zoning and other land use decisions.

The need for reassessment is most evident in those cities and counties where multiple wireless companies are seeking to locate new antenna facilities, usually towers, in residential and commercial districts.

Local officials must reassess the ways in which they make zoning and other land use decisions.

Siting Cellular Towers: What You Need to Know, What You Need to Do

Most parts of the United States, there only are two companies providing cellular telephone service today. But the Federal Communications Commission (FCC) has authorized more companies to provide personal communications services (PCS), the next generation of personal wireless services, in each of the major markets. Soon, the FCC will authorize up to four more PCS providers in each of the smaller trading markets in the nation.

In many areas, therefore, local officials can expect to see as many as eight providers seeking facilities to site antennas in their communities during the next year. The number of such antennas could grow in the United States by more than six times – to 120,000 – by the year 2000.

Companies planning to offer PCS service have already made a huge up-front investment. The federal government auctions PCS licenses through an auction process which to date has generated almost \$20 billion for the federal treasury. Some providers paid more than \$500 million for a license in a single market. Each provider wants to build its network quickly and obtain a competitive edge in the market.

In addition, consumer demand for personal wireless services is growing tremendously in response to the introduction of lightweight portable phones and increasingly affordable rates and equipment prices. Today, more than 40 million Americans use these services. That number is expected to grow to more than 100 million by the year 2000. The growth also reflects the importance of wireless services to businesses in general and to selected business operations.

Many residents object to the placement of new antennas and towers in their communities. They are concerned that these facilities will jeopardize human health and safety, damage private property, and compromise the community's aesthetics. They worry that 200-foot towers may present safety hazards in bad weather, such as ice storms or hurricanes. They are unhappy about the prospect of locating unsecured towers near school playgrounds. They are nervous about the electromagnetic radiation generated by a cellular communications facility. Finally, they do not want to see large, unsightly antenna towers dispersed throughout the community cluttering the landscape and reducing their property values.

Local government officials are faced with the challenge of balancing the demand for wireless service with the concerns of residents.

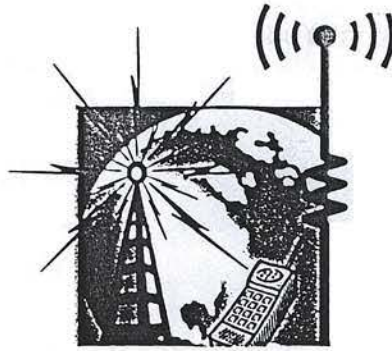
To date, the response of local governments to the tower siting dilemma has varied, ranging from blind acceptance of industry demands to active participation as partners in the siting process. Many cities and counties have amended their zoning ordinances to accommodate the growth of wireless systems and the communications needs of residents and businesses while protecting the public against any adverse impacts. Some jurisdictions, in the process of reviewing their laws, have adopted moratoria on the granting of any new applications pending completion of the review process.

Local government officials are faced with the challenge of balancing the demand for wireless service with the concerns of residents.

Many localities also have formed partnerships to deal effectively with the siting of cellular towers in their communities. These partnerships take many forms, including agreements between service providers and local governments to site antenna facilities on public property and agreements to construct new towers to support the facilities of both public and private wireless services networks. By entering into partnerships, local governments may improve their own public safety and other communications systems and reap additional revenue as well. Some cities and counties are cooperating across jurisdictional boundaries to develop a comprehensive uniform approach to the siting of wireless facilities within their region.

The pages that follow describe what personal wireless services are, explain what limits the 1996 Telecommunications Act places on local government zoning authority, and describe steps local governments are taking to develop effective cellular tower ordinances and siting policies.

The guidebook is designed to help local officials meet the challenge of reconciling industry's goal – the rapid building of wireless networks – with long-term community goals and the legitimate concerns residents have about antenna and tower facilities.



WHAT ARE CELLULAR AND PCS SERVICES AND HOW DO THEY OPERATE?

Cellular telephone service has been offered commercially for more than ten years. Prior to the development and introduction of cellular phone service, mobile telephone service offerings were limited. The older, non-cellular systems used a single high-powered radio transmitter to cover an entire community. With few allocated frequencies and channels, the old systems could only provide service to a limited number of subscribers.

Today's cellular systems overcome this limitation by subdividing their service areas into small cells, each with a low-powered radio transmitter. With this design, channels may be reused in the service area; the same channels are assigned to multiple, nonadjacent cells, significantly increasing the number of calls the system can handle at any one time and thus the number of subscribers served. A call is automatically transferred from one channel in one cell to another channel in the next cell as a subscriber moves through the service area. Most cellular systems today use conventional analog transmission technology.

PCS is a new technology and a competitor to cellular telephone service. The first broadband PCS systems began operations in 1996. PCS systems share the same "cell-shaped" design that characterizes cellular service. However, broadband PCS systems may require more antenna sites because PCS systems operate at higher frequencies than cellular phone services, frequencies at which the effective coverage area of a cell decreases. In this band, PCS systems also may provide other communications services, such as data transmission and paging, over the same frequencies.

PCS systems also differ from cellular telephone systems because they use lower power transmitters and digital transmission technologies. Future PCS services may include computer networking and wireless Internet access.

Both cellular and broadband PCS subscribers use portable phones to access or receive calls from the public switched telephone network (PSTN) through cell site antenna facilities. Antenna facilities are connected to a Mobile Telephone Switching Office (MTSO) by landline or microwave links. The MTSO is connected by trunks to the PSTN. The MTSO switches calls between the PSTN and the cell sites.

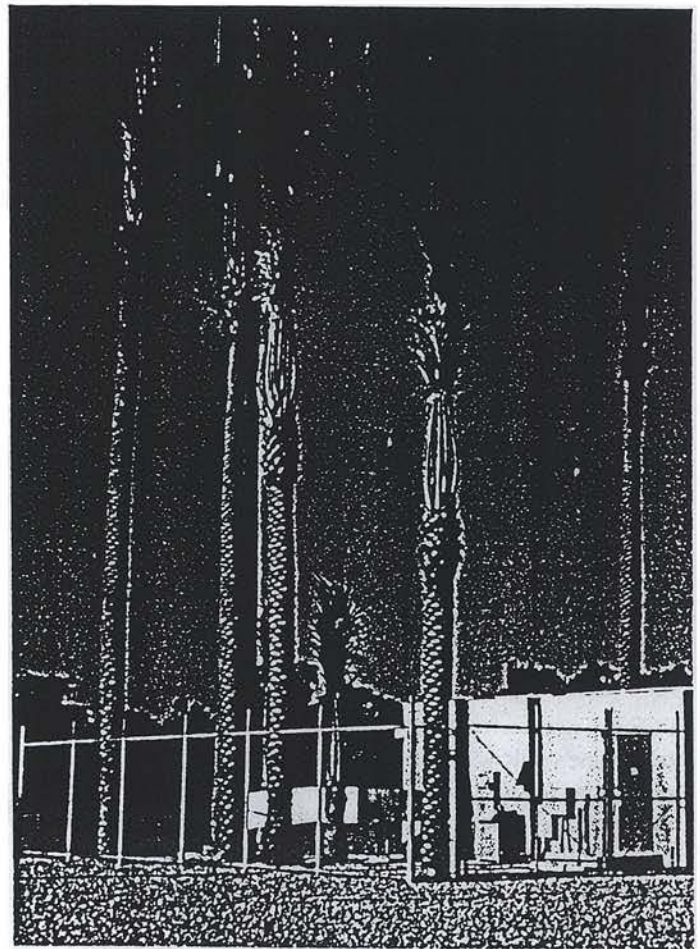
Cellular and PCS antenna facilities have been installed on communications towers, water tanks, rooftops, and street lights. In some areas, facilities have been installed in church steeples, clock towers, or camouflaged as artificial trees to address aesthetic concerns of the community.

Communications towers take many forms and vary significantly in height. A tower may be free standing or "guyed," anchored with cables. A guyed tower needs significantly more land than a free standing tower. Free standing or self-supporting towers include monopoles and three- or four-sided steel-lattice towers. Tower and tower foundation specifications depend on a variety of factors including design load, wind speed, ice load, soil conditions, building code requirements, and antenna loading.

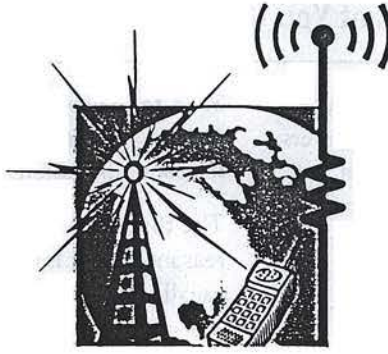
Siting Cellular Towers: What You Need to Know, What You Need to Do

Facilities have been installed in church steeples, clock towers, or camouflaged as artificial trees.

Whether the antenna is installed on a communications tower or on another structure, an antenna's height depends on several factors, including the range and characteristics of the geographic area it is expected to serve. Antenna towers generally range in height from 50 to 300 feet. In some remote areas they may even reach 500 feet. The number of antennas in a community also depends on several factors, most commonly service demand and local geography. As a system grows, the number of antenna sites increases as channels are used at closer intervals to accommodate more subscribers.



Monopole disguised as a palm tree.



LOCAL ZONING AUTHORITY OVER CELLULAR ANTENNAS AND TOWERS

Local governments exercise zoning authority to protect the health and safety of residents and to ensure orderly land use development. Local officials also use zoning to preserve the aesthetic character of the community and guard against new land uses that clutter up neighborhoods with unsightly facilities.

To a great extent, the 1996 Telecommunications Act specifically protects local zoning authority over the placement of cellular towers. At the same time, however, the law places some new federal restrictions on that authority.

The Act addresses the issue of local zoning authority over wireless telecommunications facilities in three ways. First, it establishes a general principle that local zoning authority is preserved, subject to certain conditions. Second, it lists the conditions that local zoning requirements must satisfy. Third, it identifies which disputes will be handled by the courts and which will be handled by the FCC.

Five Conditions Affecting Local Zoning Authority

If local zoning requirements satisfy certain conditions, nothing in the 1996 Telecommunications Act limits or affects the zoning authority of local governments over the placement, construction, and modification of wireless telecommunications facilities. In order to maintain their zoning authority over wireless telecommunications facilities, local governments must satisfy five conditions.

1. Local zoning requirements may not unreasonably discriminate among wireless telecommunications providers that compete against one another.

This requirement does not mean that local governments must treat competitive providers in exactly the same way if their

proposed facilities present different zoning concerns. Congress intended to give local governments flexibility in this area. The law recognizes, for example, that a proposed 50-foot tower in a residential district presents different concerns than a 50-foot tower in a commercial district, even if the two towers are going to offer services that compete with one another. As a result, applications to site these facilities may be treated differently. Another defensible difference in treatment of providers interested in siting facilities might be the order or timing of a particular request if it is for use on a limited capacity tower site.

As a general rule, however, local governments should avoid making zoning decisions that give one provider of wireless service a competitive advantage over another. Under the law, if a local government has no rational basis for making a distinction between providers whose facilities have identical characteristics, differential treatment of those providers is prohibited. For example, a zoning ordinance that permits one provider of wireless services to construct a tower in a commercial district, but prohibits the construction of a similarly sized tower by another provider in that same commercial district with no other distinguishable differences in impact, is probably inviting a challenge based upon unreasonable discrimination.

2. Local zoning requirements may not prohibit or have the effect of prohibiting the provision of wireless telecommunications service.

This requirement is designed to prevent local governments from imposing outright bans on wireless telecommunications services. However, local ordinances may limit the number and placement of facilities so long as those limits do not prohibit or have the effect of prohibiting a wireless telecommunications

Siting Cellular Towers: What You Need to Know, What You Need to Do

provider's ability to offer service. An ordinance might include such severe restrictions on the placement and number of towers in a community that they interfere with the reception of a signal and make it impossible to deliver service. In such a case, the fact that a local government ordinance permits the siting of cellular towers is insufficient to meet the requirements of the Act if the community remains unable to receive satisfactory service.

There is no requirement that every local community have a cellular tower. The Act says that there should be no prohibition on the service; it says nothing about the specific facilities. Therefore, a community of small geographic size might be able to limit the number of towers, or avoid a cellular tower completely, if it can demonstrate that subscribers can receive adequate service from towers located outside the jurisdiction's corporate boundaries.

Some local governments have instituted temporary freezes or moratoria on the granting of facility siting permits in order to review the requirements of the 1996 Act, develop relevant ordinances, and make long-term land use assessments. The Cellular Telecommunications Industry Association has challenged such moratoria before the FCC, claiming that they are a barrier to market entry and violate the Act. At least one court has determined that a short moratorium is not a "prohibition on wireless facilities, nor does it have a prohibitory effect. It is, rather, a short term suspension of permit issuing while the city gathers information and processes applications." *Sprint Spectrum, L.P. v. City of Medina, Washington*.

Instituting moratoria on the processing of applications and the granting of tower siting permits should not become a regular practice by local governments. If a locality determines that a brief moratorium is necessary in order to develop a procedure for the effective handling of siting requests, the FCC (in its Fact Sheet on National Wireless Facilities Siting policies) recommends that the locality communicate with wireless service providers about the intended duration of the moratorium, the tasks the locality wishes to accomplish during the moratorium, and the ways – such as by providing additional information about facilities and services – in which the providers can assist the locality in ending the moratorium.

There is no requirement that every local community have a cellular tower.

3. A local government must act within a reasonable period of time on requests for permission to place or construct wireless telecommunications facilities.

The time taken to act on an application will be considered reasonable if it is no longer than the time the local government usually takes to act on other requests – such as zoning variances – of comparable magnitude that have nothing to do with telecommunications facilities. The Act does not require local governments to give preferential treatment to zoning requests involving telecommunications facilities – such requests can wait their turn. The request should not be moved down the list, but it does not have to be moved up the list.

4. Any city or county council or zoning board decision denying a request for permission to install or construct wireless telecommunications facilities must be in writing and must be based on evidence in a written record before the council or board.

This requirement may necessitate a considerable change in practice for some local governments, since it means that written proceedings on a zoning application must be produced. This can be done by having the proceedings transcribed and by requiring the applicant, the city or county staff, and any interested members of the public to submit their comments and arguments in writing to the council or board. Local government staff must ensure that any facts or arguments on which the council or board may rely in denying a request are included in the transcribed hearing or written filings submitted to the council or board before its decision is made. The decision itself also must be in writing and contain reasons that are consistent with the Act's requirements. Localities should consult extensively with city or county attorneys to implement this requirement.

5. If a wireless telecommunications facility meets technical emissions standards set by the FCC, it is presumed safe. A local government may not deny a request to construct a facility on grounds that its radiofrequency emissions would be harmful to the environment or the health of residents if those emissions meet FCC standards.

The Act gives the FCC, not local governments, the sole authority to determine what standards wireless facilities must meet to ensure that their radiofrequency emissions do not harm humans or the environment. While local governments can require facilities to comply with the FCC emissions standards, they may not adopt their own standards. If the facilities meet FCC emissions standards, concern about the effects of

LOCAL ZONING AUTHORITY OVER CELLULAR ANTENNAS AND TOWERS

emissions from cellular towers on the health of nearby residents is not a permissible reason for making zoning decisions about the placement of wireless telecommunications facilities.

The Act does not require local governments to give preferential treatment to zoning requests involving telecommunications facilities.

On August 6, 1996, the FCC adopted revised guidelines (Report and Order, FCC 96-326) for evaluating the environmental effects of radiofrequency emissions. Copies of the FCC's Report and Order adopting these guidelines can be obtained from the FCC's duplication contractor, International Transcription Service, 2100 M Street, NW, Suite 140, Washington, DC 20037, 202-857-3800.

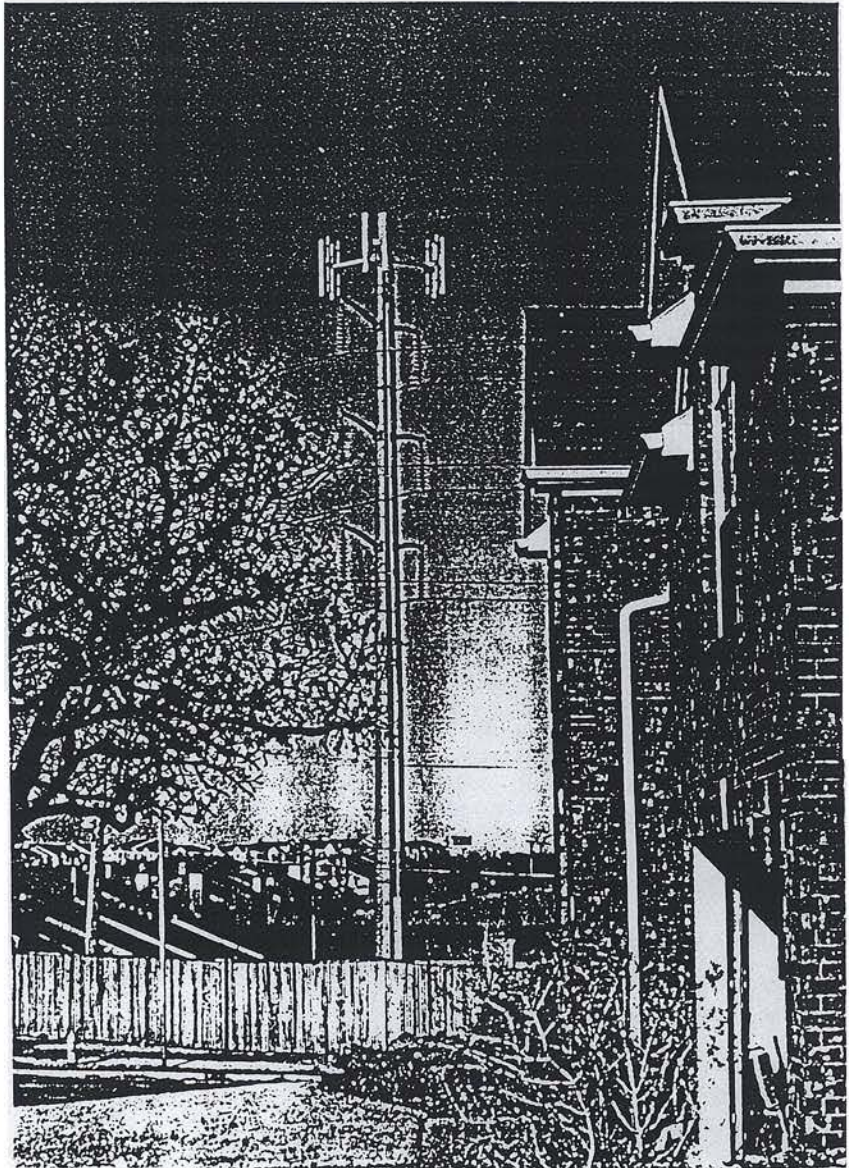
Localities can require providers to comply with other federal regulations prior to issuing a tower construction or modification permit. For example, towers taller than 200 feet and located within a certain distance of airport runways must be registered with the FCC. The FCC works with the Federal Aviation Administration (FAA) to ensure that such towers are appropriately constructed, marked, painted, and lighted so that they do not create a hazard to air navigation.

Towers also must comply with the requirements of the National Environmental Policy Act (NEPA) and the requirements of those regulations implementing NEPA affecting wilderness areas, wildlife preserves, endangered species, historical sites, Indian religious sites, floodplains, wetlands, high intensity white lights in residential neighborhoods, and radiofrequency emissions in excess of the FCC's guidelines.

Dispute Resolution

If a wireless provider claims that a local government has violated any of the first four conditions above, that provider must seek relief in a state or federal court, not from the FCC. This provision in the Telecommunications Act was a victory for local governments. State and federal courts provide a more neutral and much less costly arena for parties to resolve disputes than the FCC, where industry attorneys have a decided financial and practical advantage over city and county attorneys.

A disappointed applicant may go to the FCC only if it claims that the locality improperly based its adverse siting decision on the harmful effects of radiofrequency emissions from the proposed facility.



Antenna array installation on existing transmission tower.