Case File Number: PLN14036 April 1, 2015

1265 Mountain Boulevard (located in the Public Right-of-Way

Location: adjacent to 1265, 1244, & 1300 Mountain Boulevard (See map on

reverse)

Assessors Parcel Number: Adjacent to APN: 048G-7418-023-01, 048G-7404-018-00, and

048G-7418-062-00,

Proposal: Placement of two (2) antennas on a PG&E utility pole on the west side of the

street and associated equipment on a separate PG&E utility pole directly across the street (the east side of Mountain Blvd.). This is a proposal for a Macro Telecommunication facility. Both poles are in the process of being

replaced by PG&E.

Applicant: Matt Yergovich & Associates LLC for AT&T

Contact Person/ Phone Matt Yergovich (415)596-3474

Number:

Owner: PG&E & New Cingular Wireless PCS, LLC Joint Utility Pole located in the

City of Oakland Public right of way

Case File Number: PLN14036

Planning Permits Required: Regular Design Review for the replacement of two (2) antennas; one (1) new

Radio Remote Unit (RRU), and new associated equipment on two replacment

utility poles in the public right of way

Macro telecommunication facility within 100 feet of a residential zone.

General Plan: Hillside Residential

Zoning: RH-4 Hillside Residential Zone-4

Environmental Determination: Exempt, Sections 15301, 15302, and 15303 of the State CEQA Guidelines;

minor additions and alterations to existing structures, replacement or

reconstruction of existing structures, and new small facilities.

Section 15183 of the State CEQA Guidelines; projects consistent with a

community plan, general plan or zoning.

Historic Status: No Historic Record

Service Delivery District: 2
City Council District: 4

Date Filed: 3/6/14

Finality of Decision: Appealable to City Council within 10 days

For Further Information: Contact case planner Moe Hackett at (510) 238-3973 or

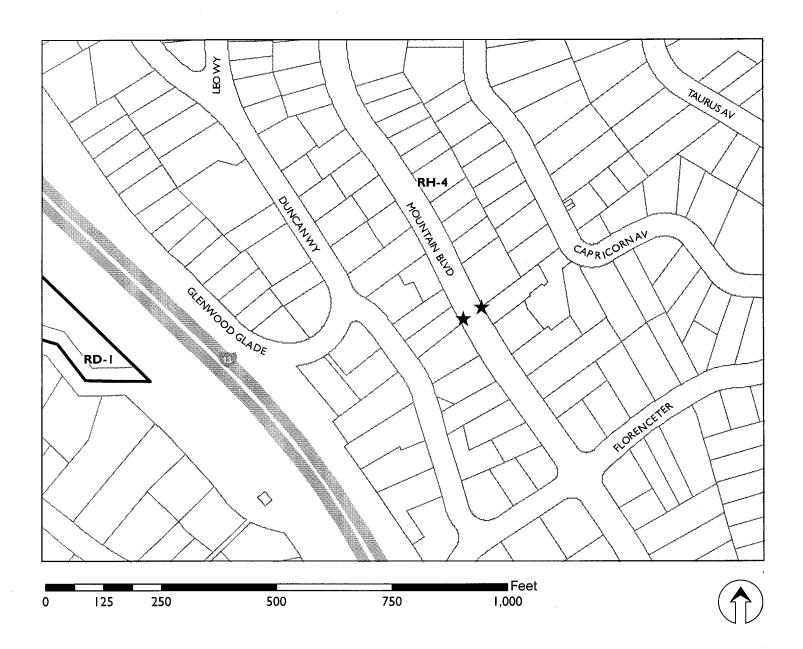
mhackett@oaklandnet.com

SUMMARY

This project would provide for the establishment of a macro telecommunications facility consisting of two (2) antennas, one (1) Radio Unit, and other associated equipment cabinets to be located on two utility poles within the public right of way. The poles are both scheduled to be replaced by PG&E, and exist within a joint pole authority of which PG&E & New Cingular Wireless PCS, LLC are members.

Major Design Review is required for the creation, expansion and alterations of a Macro telecommunications facility involving modifications to existing utility poles located in or within 100' of a residential zone. As detailed below, the project meets all of the required findings for approval. Therefore, staff recommends approval of the project subject to the attached conditions.

CITY OF OAKLAND PLANNING COMMISSION



Case File: PLN14036

Applicant: Matt Yergovich (for: AT&T)

Address: Public right-of-way adjacent to

1244, 1265 and 1300 Mountain Boulevard

Zone: RH-4

PROJECT DESCRIPTION

This project would provide for the establishment of a Macro telecommunication facility consisting of two (2) antennas on a new utility pole (replacing an existing utility pole) on the west side of Mountain Boulevard and associated utility pole mounted equipment on a second utility pole (also to be replaced) located on the east side of the street. The project would also allow for one (1) radio unit. The existing poles are located in the public right-of-way approximately mid-way on the block of Mountain Boulevard between Broadway Terrace and Florence Terrace.

TELECOMMUNICATIONS BACKGROUND

Limitations on Local Government Zoning Authority under the Telecommunications Act of 1996

Section 704 of the Telecommunications Act of 1996 (TCA) provides federal standards for the siting of "Personal Wireless Services Facilities." "Personal Wireless Services" include all commercial mobile services (including personal communications services (PCS), cellular radio mobile services, and paging); unlicensed wireless services; and common carrier wireless exchange access services. Under Section 704, local zoning authority over personal wireless services is preserved such that the FCC is prevented from preempting local land use decisions; however, local government zoning decisions are still restricted by several provisions of federal law.

Under Section 253 of the TCA, no state or local regulation or other legal requirement can prohibit or have the effect of prohibiting the ability of any entity to provide any interstate or intrastate telecommunications service.

Further, Section 704 of the TCA imposes limitations on what local and state governments can do. Section 704 prohibits any state and local government action which unreasonably discriminates among personal wireless providers. Local governments must ensure that its wireless ordinance does not contain requirements in the form of regulatory terms or fees which may have the "effect" of prohibiting the placement, construction, or modification of personal wireless services.

Section 704 also preempts any local zoning regulation purporting to regulate the placement, construction and modification of personal wireless service facilities on the basis, either directly or indirectly, on the environmental effects of radio frequency emissions (RF) of such facilities, which otherwise comply with FCC standards in this regard. See, 47 U.S.C. 332(c)(7)(B)(iv) (1996). This means that local authorities may not regulate the siting or construction of personal wireless facilities based on RF standards that are more stringent than those promulgated by the FCC.

Section 704 mandates that local governments act upon personal wireless service facility siting applications to place, construct, or modify a facility within a reasonable time. 47 U.S.C.332(c)(7)(B)(ii). See FCC Shot Clock ruling setting forth "reasonable time" standards for applications deemed complete. Section 704 also mandates that the FCC provide technical support to local governments in order to encourage them to make property, rights-of-way, and easements under their jurisdiction available for the placement of new spectrum-based telecommunications services. This proceeding is currently at the comment stage.

For more information on the FCC's jurisdiction in this area, contact Steve Markendorff, Chief of the Broadband Branch, Commercial Wireless Division, Wireless Telecommunications Bureau, at (202) 418-0640 or e-mail "smarkend@fcc.gov".

PROPERTY DESCRIPTION

The existing utility poles are located on the public right-of-way sidewalk reserve (unfinished) of Mountain Boulevard. Both utility poles are scheduled to be replaced by PG&E out of abundance of caution and pursuant to CPUC General Order 95. The new poles will increase in height from 36 feet to 43 feet. The telecommunication facilities would be self-contained and unmanned and would be mounted to two separate poles, with the equipment cabinet's pole on the east side of the street (in a vegetated divide between 1244 and 1300 Mountain), and the 2 antennas only mounted above the pole on the west side of Mountain. The subject site is located within a residential zone and surrounded by residential properties.

GENERAL PLAN ANALYSIS

The subject property is located within the Hillside Residential General Plan designation. The Hillside Residential land use classification is intended to create, maintain and enhance neighborhood residential areas that are characterized by detached, single unit structures on hillside lots. The proposed unmanned wireless telecommunication facility will not adversely affect or detract from the residential characteristics of the neighborhood along Mountain Boulevard.

ZONING ANALYSIS

The zoning for the subject property is RH-4, Hillside Residential Zone-4. The intent of the RH-4 zone is to create, maintain, and enhance areas for single-family dwellings on lots of 6,500 to 8,000 square feet and is typically appropriate in already developed areas of the Oakland Hills. Major Design Review is required for the addition of a Macro Telecommunication Facility mounted on the utility poles since the project is located in a residential zone. Staff finds that the proposed application meets the City of Oakland Telecommunication regulations (see Findings for Approval).

ENVIRONMENTAL DETERMINATION

The California Environmental Quality Act (CEQA) Guidelines lists the projects that qualify as categorical exemptions from environmental review. The proposed project is categorically exempt from the environmental review requirements pursuant to Sec. 15301, minor alterations to an existing facility, Sec. 15302 replacement or reconstruction of existing structures and facilities, Sec. 15303, construction of new small facilities, and 15183, projects consistent with the general plan or zoning.

KEY ISSUES AND IMPACTS

1. Design Review

The project is located along the public right-of-way of Mountain Boulevard. The proposed antenna and equipment cabinets will be painted to match the poles and placed approximately 30' and 10' respectively above grade away from the line of sight associated with abutting residential properties. The equipment cabinet and antennas are proposed to be located on separate poles to reduce the total overall massing on a single pole. The choice of the east side pole for the equipment cabinets was chosen because it offered the least obtrusive visual impacts for the west facing (view) windows of the upslope houses. The site for this Macro Telecommunication facility was determined to be the best location option as part of the alternative site analysis that was performed by the applicant. The structural stability and safety of the existing and replacement pole and its appurtenances is assured by the City's Building Bureau, the Fire Department, and by the owner of the pole (PG&E).

2. Project Site

Section 17.128.110 of the City of Oakland Telecommunication Regulations requires that wireless facilities shall generally be located on designated properties or facilities in the following order of preference:

- A. Co-located on an existing structure or facility with existing wireless antennas.
- B. City owned properties or other public or quasi-public facilities.
- C. Existing commercial or industrial structures in non-residential zones.
- D. Existing commercial or industrial structures in residential zones.
- E. Other non-residential uses in residential zones.
- F. Residential uses in non-residential zones.
- G. Residential uses in residential zones.

Since the proposed project involves the co-location of an unmanned wireless telecommunications facility on existing utility poles (one with an existing City street light), the proposed development meets the (B) City owned properties or other public or quasi-public facilities, therefore a site alternatives analysis is not required.

3. Project Design

Section 17.128.120 of the City of Oakland Telecommunications Regulations indicates that new wireless facilities shall generally be designed in the following order of preference:

- A. Building or structure mounted antennas completely concealed from view.
- B. Building or structure mounted antennas set back from roof edge, not visible from public right-of way.
- C. Building or structure mounted antennas below roof line (facade mount, pole mount) visible from public right-of-way, painted to match existing structure.
- D. Building or structure mounted antennas above roof line visible from public right of-way.
- E. Monopoles.
- F. Towers.
- * Facilities designed to meet an A or B ranked preference do not require site design alternatives analysis. Facilities designed to meet a C through F ranked preference, inclusive, must submit a site design alternatives analysis as part of the required application materials. This project is a proposed co-location establishing a new telecommunications facility.

The project best meets design criteria (A) and (C) since the panel antennas, though not screened, will be located in the least obtrusive location available. As proposed, the antenna and equipment cabinets have been co-located on replacement utility poles at angles and levels that are (to the greatest extent possible) below the sight lines / the interior views of the nearest homes. While it is impossible to completely conceal from view pole mounted telecommunications appurtenances the considerable bulk of the equipment cabinets and the antenna mountings have been divided in to two locations (poles) rather than placed on one single pole. The placement of the equipment on the east side of the street is done in an attempt to screen some of its bulk by placing it within close proximity to existing trees and other vegetation which is not present on the west side of the street. Collocating on existing (replacement) poles is seen as a better option that establishing a wholly new utility pole in the public right of way. Finally all proposed antennas and equipment are to be painted to match the utility /light pole thus minimizing their impacts from the public view. Furthermore, to

^{*}Facilities locating on an A, B or C ranked preference do not require a site alternatives analysis.

Case File Number: PLN14036

Page 6

mitigate visual impacts the equipment and antenna will be mounted at least 10' above any pedestrian pathway. The review of the site and surrounding area has established no feasible or superior alternate site.

4. Project Radio Frequency Emissions Standards

Section 17.128.130 of the City of Oakland Telecommunication Regulations require that the applicant submit the following verifications including requests for modifications to existing facilities:

- a. With the initial application, a RF emissions report, prepared by a licensed professional engineer or other expert, indicating that the proposed site will operate within the current acceptable thresholds as established by the Federal government or any such agency who may be subsequently authorized to establish such standards.
- b. Prior to commencement of construction, a RF emissions report indicating the baseline RF emissions condition at the proposed site.
- c. Prior to final building permit sign off, an RF emissions report indicating that the site is actually operating within the acceptable thresholds as established by the Federal government or any such agency who may be subsequently authorized to establish such standards.

A RF emissions report, prepared by EBI Consulting, (Attachment B) indicated that the proposed project meets the radio frequency (RF) emissions standards as required by the regulatory agency. The report states that the proposed project will comply with the prevailing standards for limiting public exposure to radio frequency energy and, therefore, will not cause a significant impact on the environment. Additionally, staff recommends that prior to the issuance of a final building permit, that the applicant submits certified RF emissions report stating that the facility is operating within acceptable thresholds established by the regulatory federal agency.

CONCLUSION

The proposed project meets all of the required findings for approval. Therefore, staff recommends approval of the project subject to the attached conditions.

RECOMMENDATIONS:

- 1. Affirm staff's environmental determination
- 2. Approve Major Design Review application PLN14036 subject to the attached findings and conditions of approval.

Prepared by:

Moe Hackett

Planner II

Approved by:

Scott Miller Zoning Manager

Case File Number: PLN14036

Page 7

Approved for forwarding to the City Planning Commission

Darin Ranelletti

Deputy Director of Department of Planning and Building

ATTACHMENTS:

- A. Project Plans & Photo simulation
- B. AT&T Mobility Radio Frequency Statement
- C. Correspondence

FINDINGS FOR APPROVAL

FINDINGS FOR APPROVAL:

This proposal meets all the required findings under Section 17.136.050.(B), of the Non-Residential Design Review criteria; all the required findings under Section 17.128.070(B), of the telecommunication facilities (Macro) Design Review criteria; and as set forth below and which are required to approve your application. Required findings are shown in **bold** type; reasons your proposal satisfies them are shown in normal type.

17.136.050(B) - NONRESIDENTIAL DESIGN REVIEW CRITERIA:

1. That the proposal will help achieve or maintain a group of facilities which are well related to one another and which, when taken together, will result in a well-composed design, with consideration given to site, landscape, bulk, height, arrangement, texture, materials, colors, and appurtenances; the relation of these factors to other facilities in the vicinity; and the relation of the proposal to the total setting as seen from key points in the surrounding area. Only elements of design which have some significant relationship to outside appearance shall be considered, except as otherwise provided in Section 17.136.060;

The proposal is to establish a Macro Telecommunication facility consisting of two (2) antennas and associated equipment cabinets that would be mounted on two separate utility poles (one containing a city street light) on either side of Mountain Boulevard. The proposed antennas and equipment cabinet would be painted to match the existing pole to which they would be mounted. The equipment cabinets and antennas are placed on their respective poles at heights and locations that are calculated to have the fewest visual impacts as seen from within the nearby houses primary view windows. As designed this proposal is consistent and well related to the surrounding area in scale, bulk, height, materials, and textures by blending in as an appurtenance on the utility poles.

2. That the proposed design will be of a quality and character which harmonizes with, and serves to protect the value of, private and public investments in the area;

The proposal protects and preserves the surrounding neighborhood context by adding additional wireless telecommunication antennas to a residential area on two separate utility poles, and thus reducing the combined visual impacts were the devices combined on a single pole. The antennas will be located approximately 30' (center) above grade on a level area at the Street and will have little visual impact on the neighborhood. The equipment cabinet (on the east side of the street) will be located approximately 11 feet above the ground and will reach a height of approximately 19 feet above the street.

3. That the proposed design conforms in all significant respects with the Oakland General Plan and with any applicable design review guidelines or criteria, district plan, or development control map which have been adopted by the Planning Commission or City Council.

The proposal conforms with the City of Oakland General Plan meeting specific General Plan policies (N2.2) and the Supplemental Report and Recommendations on Revisions to the Citywide Telecommunications Regulations. The proposal will conform to performance standards for noise set forth in Section 17.120.050 for decibels levels in residential areas for both day and nighttime use. The

Project conforms to all macro-facility definitions set forth in Section 17.128.070 and meets all design review criteria to minimize all impacts throughout the neighborhood.

DESIGN REVIEW CRITERIA FOR MACRO FACILITIES (OMC SEC. 17.128.070(B)):

1. Antennas should be painted and/or textured to match the existing structure.

The antennas will be painted matte brown to match the color of the wooden pole, as conditioned.

2. Antennas mounted on architecturally significant structures or significant architectural detail of the building should be covered by appropriate casings which are manufactured to match existing architectural features found on the building.

The antennas will be attached to a replacement wooden utility pole.

3. Where feasible, antennas can be placed directly above, below or incorporated with vertical design elements of a building to help in camouflaging.

The antennas will be mounted directly on top of a new wooden utility pole in the same approximate location as the existing pole.

4. Equipment shelters or cabinets shall be screened from the public view by using landscaping, or materials and colors consistent with surrounding backdrop or placed underground or inside existing facilities or behind screening fences.

As conditioned, equipment cabinets will be mounted to the pole in a singular shroud that is significantly smaller than typical ground mounted cabinets and shelters and the exterior will be painted matte brown to match the color of the wooden pole.

5. Equipment shelters or cabinets shall be consistent with the general character of the area.

As conditioned, equipment cabinets will be housed in a singular shroud attached to a new wooden utility pole and painted to match its color.

6. For antennas attached to the roof, maintain a 1:1 ratio (example: ten feet high antenna requires ten feet setback from facade) for equipment setback; screen the antennas to match existing air conditioning units, stairs, or elevator towers; avoid placing roof mounted antennas in direct line with significant view corridors.

This finding is inapplicable; the proposal does not involve a roofed structure.

7. That all reasonable means of reducing public access to the antennas and equipment has been made, including, but not limited to, placement in or on buildings or structures, fencing, anti climbing measures and anti-tampering devices.

Equipment will be pole mounted a minimum of 10' above grade of the street and, as conditioned, will be encased in a shroud; the antenna will be located at 30' (center) above the street.

CONDITIONS OF APPROVAL

STANDARD CONDITIONS:

1. Approved Use

Ongoing

- a) The project shall be constructed and operated in accordance with the authorized use as described in the application materials, PLN14036, and the plans dated November 14, 2014 and submitted on February 2, 2015 and as amended by the following conditions. Any additional uses or facilities other than those approved with this permit, as described in the project description and the approved plans, will require a separate application and approval. Any deviation from the approved drawings, Conditions of Approval or use shall require prior written approval from the Director of City Planning or designee.
- b) This action by the City Planning Commission ("this Approval") includes the approvals set forth below. This Approval includes: the creation of two (2) antennas and associated equipment and cabinets (including one radio unit) on two Utility Poles in the public right of way of Mountain Boulevard. These Macro Telecommunication facilities will be located in the public right-of-way in front of 1244, 1265, and 1300 Mountain Boulevard(adjacent to APN: 048G-7418-023-01, 048G-7404-018-00, and 048G-7418-062-00), under Oakland Planning Code 17.128 and 17.136.

2. Effective Date, Expiration, Extensions and Extinguishment

Ongoing

Unless a different termination date is prescribed, this Approval shall expire **two calendar years** from the approval date, unless within such period all necessary permits for construction or alteration have been issued, or the authorized activities have commenced in the case of a permit not involving construction or alteration. Upon written request and payment of appropriate fees submitted no later than the expiration date of this permit, the Director of City Planning or designee may grant a one-year extension of this date, with additional extensions subject to approval by the approving body. Expiration of any necessary building permit for this project may invalidate this Approval if the said extension period has also expired.

3. Scope of This Approval; Major and Minor Changes

Ongoing

The project is approved pursuant to the **Oakland Planning Code Telecommunications Regulations** only. Minor changes to approved plans may be approved administratively by the Director of City Planning or designee. Major changes to the approved plans shall be reviewed by the Director of City Planning or designee to determine whether such changes require submittal and approval of a revision to the approved project by the approving body or a new, completely independent permit.

4. Conformance with other Requirements

Prior to issuance of a demolition, grading, P-job, or other construction related permit

a) The project applicant shall comply with all other applicable federal, state, regional and/or local codes, requirements, regulations, and guidelines, including but not limited to those imposed by the City's Building Services Division, the City's Fire Marshal, and the City's Public Works Agency.

b) The applicant shall submit approved building plans for project-specific needs related to fire protection to the Fire Services Division for review and approval, including, but not limited to automatic extinguishing systems, water supply improvements and hydrants, fire department access, and vegetation management for preventing fires and soil erosion.

5. <u>Conformance to Approved Plans; Modification of Conditions or Revocation</u> Ongoing

- a) Site shall be kept in a blight/nuisance-free condition. Any existing blight or nuisance shall be abated within 60-90 days of approval, unless an earlier date is specified elsewhere.
- b) The City of Oakland reserves the right at any time during construction to require certification by a licensed professional that the as-built project conforms to all applicable zoning requirements, including but not limited to approved maximum heights and minimum setbacks. Failure to construct the project in accordance with approved plans may result in remedial reconstruction, permit revocation, permit modification, stop work, permit suspension or other corrective action.
- c) Violation of any term, conditions or project description relating to the Approvals is unlawful, prohibited, and a violation of the Oakland Municipal Code. The City of Oakland reserves the right to initiate civil and/or criminal enforcement and/or abatement proceedings, or after notice and public hearing, to revoke the Approvals or alter these conditions if it is found that there is violation of any of the conditions or the provisions of the Planning Code or Municipal Code, or the project operates as or causes a public nuisance. This provision is not intended to, nor does it, limit in any manner whatsoever the ability of the City to take appropriate enforcement actions.

6. Signed Copy of the Conditions

With submittal of a demolition, grading, and building permit

A copy of the approval letter and conditions shall be signed by the property owner, notarized, and submitted with each set of permit plans to the appropriate City agency for this project.

7. Indemnification

Ongoing

- a) To the maximum extent permitted by law, the applicant shall defend (with counsel acceptable to the City), indemnify, and hold harmless the City of Oakland, the Oakland City Council, the City of Oakland Redevelopment Agency, the Oakland City Planning Commission and its respective agents, officers, and employees (hereafter collectively called City) from any liability, damages, claim, judgment, loss (direct or indirect)action, causes of action, or proceeding (including legal costs, attorneys' fees, expert witness or consultant fees, City Attorney or staff time, expenses or costs) (collectively called "Action") against the City to attack, set aside, void or annul, (1) an approval by the City relating to a development-related application or subdivision or (2) implementation of an approved development-related project. The City may elect, in its sole discretion, to participate in the defense of said Action and the applicant shall reimburse the City for its reasonable legal costs and attorneys' fees.
- b) Within ten (10) calendar days of the filing of any Action as specified in subsection A above, the applicant shall execute a Letter Agreement with the City, acceptable to the Office of the City Attorney, which memorializes the above obligations. These obligations and the Letter of Agreement shall survive termination, extinguishment or

invalidation of the approval. Failure to timely execute the Letter Agreement does not relieve the applicant of any of the obligations contained in this condition or other requirements or conditions of approval that may be imposed by the City.

8. Compliance with Conditions of Approval

Ongoing

The project applicant shall be responsible for compliance with the recommendations in any submitted and approved technical report and all the Conditions of Approval set forth below at its sole cost and expense, and subject to review and approval of the City of Oakland.

9. Severability

Ongoing

Approval of the project would not have been granted but for the applicability and validity of each and every one of the specified conditions, and if any one or more of such conditions is found to be invalid by a court of competent jurisdiction this Approval would not have been granted without requiring other valid conditions consistent with achieving the same purpose and intent of such Approval.

10. Job Site Plans

Ongoing throughout demolition, grading, and/or construction

At least one (1) copy of the stamped approved plans, along with the Approval Letter and Conditions of Approval, shall be available for review at the job site at all times.

11. Operational Noise

Ongoing.

Noise levels from the activity, property, or any mechanical equipment on site shall comply with the performance standards of Section 17.120 of the Oakland Planning Code and Section 8.18 of the Oakland Municipal Code. If noise levels exceed these standards, the activity causing the noise shall be abated until appropriate noise reduction measures have been installed and compliance verified by the Planning and Zoning Division and Building Services.

12. Days/Hours of Construction Operation

Ongoing throughout demolition, grading, and/or construction

The project applicant shall require construction contractors to limit standard construction activities as follows:

- a) Construction activities are limited to between 7:00 AM and 7:00 PM Monday through Friday, except that pile driving and/or other extreme noise generating activities greater than 90 dBA shall be limited to between 8:00 a.m. and 4:00 p.m. Monday through Friday.
- b) Any construction activity proposed to occur outside of the standard hours of 7:00 am to 7:00 pm Monday through Friday for special activities (such as concrete pouring
 - which may require more continuous amounts of time) shall be evaluated on a case by case basis, with criteria including the proximity of residential uses and a consideration of resident's preferences for whether the activity is acceptable if the overall duration of construction is shortened and such construction activities shall only be allowed with the prior written authorization of the Building Services Division.
- c) Construction activity shall not occur on Saturdays, with the following possible exceptions:

Case File Number: PLN14036

Page 13

- i. Prior to the building being enclosed, requests for Saturday construction for special activities (such as concrete pouring which may require more continuous amounts of time), shall be evaluated on a case by case basis, with criteria including the proximity of residential uses and a consideration of resident's preferences for whether the activity is acceptable if the overall duration of construction is shortened. Such construction activities shall only be allowed on Saturdays with the prior written authorization of the Building Services Division.
- ii. After the building is enclosed, requests for Saturday construction activities shall only be allowed on Saturdays with the prior written authorization of the Building Services Division, and only then within the interior of the building with the doors and windows closed.
- d) No extreme noise generating activities (greater than 90 dBA) shall be allowed on Saturdays, with no exceptions.
- e) No construction activity shall take place on Sundays or Federal holidays.
- f) Construction activities include but are not limited to: truck idling, moving equipment (including trucks, elevators, etc) or materials, deliveries, and construction meetings held onsite in a non-enclosed area.

PROJECT SPECIFIC CONDTIONS:

13. Emissions Report

Prior to a final inspection

The applicant shall provide an RF emissions report to the City of Oakland Zoning Division indicating that the site is actually operating within the acceptable thresholds as established by the Federal government or any such agency that may be subsequently authorized to establish such standards.

14. Architectural Detailing and Painting

Prior to the final building permit sign off

The applicant shall paint the light pole (monopole), all proposed antennas, and other related equipment attached brown to match the existing pole.

15. Underground Districts

Ongoing

Should the utility pole be voluntarily removed for purposes of district under grounding or otherwise, the telecommunications facility can only be re-established by applying for and receiving approval of a new application to the Oakland Planning and Zoning Division as required by the regulations.

ikiana Cuy Pianning Commis	Ston	April 1, 201
se File Number: PLN14036		Page
APPROVED BY:		
City Planning Commission:	(date)	(vote)
City Council:	(date)	(vote)
Commission action on	sibility for the Conditions of Approval, as a large to abide by and conform to these con Zoning Code and Municipal Code pertaining	nditions, as well as to
Signature of Owner/Applicant	·	(date)
Signature of Contractor		(date)







PROPRIFTARY INFORMATION

THE INFORMATION CONTAINED IN THIS SET OF CONSTRUCTION DOCUMENTS IS PROPRIETARY BY NATURE. ANY USE OR DISCLOSURE OTHER THAN THAT WHICH RELATES TO CARRIER SERVICES IS STRICTLY PROHIBITED.

PHONE: (415) 596-3474

4430 ROSEWOOD DR, BLDG 3 PLEASANTON, CA 94588-3050 PROJECT INFORMATION:

OAKHILLS AT&T SOUTH NETWORK NODE 046B

NEW CINGULAR WIRELESS PCS, LLC

at&t

1265 MOUNTAIN BLVD OAKLAND, CA 94611

CURRENT ISSUE DATE:

11/14/14

SSUED FOR:

ZONING

BY: = DATE: = DESCRIPTION: === REV: ACI 11/14/14 FOUIPMENT POLE CHANGE OUT ACI 10/06/14 STRUCTURAL ADDJUSTMENTS ACI 10/17/13 SPLIT POLE CONFIG ACI 12/14/12 DATE DESCRIPTION

PLANS PREPARED BY:



5711 Research Drive

CONSTRUCTED BY:=



3030 Warrenville Rd, Suite 340 Lisle, IL 60532

SEAL OF APPROVAL:

SHEET TITLE: =

TITLE SHEET AND PROJECT INFORMATION

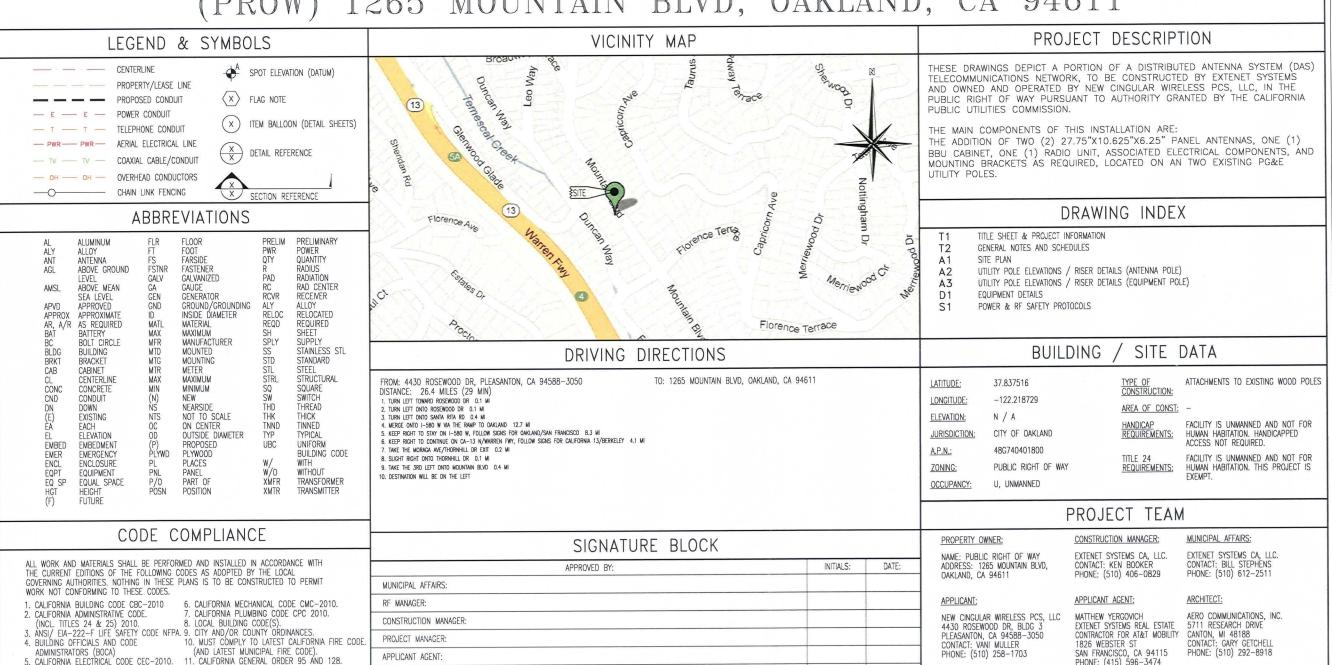
SHEET NUMBER:

REVISION:

3 11/14/14

OAKHILLS AT&T SOUTH NETWORK 0AKS-046B

1265 MOUNTAIN BLVD, OAKLAND, CA 94611



APPLICANT:

- 1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SURVEY MONUMENTS AND/OR VERTICAL CONTROL BENCHMARKS WHICH ARE DISTURBED OR DESTROYED BY CONSTRUCTION. A LAND SURVEYOR MUST FIELD LOCATE, BENEFIAMENS WHICH TARE DISTORED ON RESIRVED BY CONSTRUCTION, A MAD STREETE OF ANY EARTHMORK, IF DESTROYED, SUCH MONUMENTS SHALL HISTORICAL OR CONTROLLING MONUMENTS PROR TO ANY EARTHMORK, IF DESTROYED, SUCH MONUMENTS SHALL BE REPLACED WITH APPROPRIATE MONUMENTS BY A LAND SURVEYOR. A CORNER RECORD OR RECORD OF SURVEY, AS APPROPRIATE, SHALL BE FILED AS REQUIRED BY THE
- 2 IMPORTANT NOTICE: SECTION 4215 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A "PERMIT TO EXCAMATE" WILL BE VALID. FOR YOUR DIG ALERT I.D. NUMBER, CALL UNDERGROUND SERVICE ALERT, TOLL FREE 1-800-227-2600, TWO DAYS BEFORE YOU DIG.
- 3. CONTRACTOR SHALL BE RESPONSIBLE FOR THE POT HOLE AND LOCATING OF ALL EXISTING UTILITIES THAT CROSS THE PROPOSED TRENCH LINE AND MUST MAINTAIN A 1' MINIMUM VERTICAL CLEARANCE
- I, IF ANY EXISTING HARDSCAPE OR LANDSCAPE INDICATED ON THE APPROVE PLANS IS DAMAGED OR REMOVED DURING DEMOLITION OR CONSTRUCTION, IT SHALL BE REPAIRED AND/OR REPLACED IN KIND PER THE APPROVED
- 5. CONTRACTOR SHALL REPLACE OR REPAIR ALL TRAFFIC SIGNAL LOOPS, CONDUIT, AND LANE STRIPING DAMAGED DURING CONSTRUCTION.
- 6. THIS PROJECT WILL BE INSPECTED BY ENGINEERING AND FIELD ENGINEERING DIVISION
- 7 MANHOLES OR COVERS SHALL BE LABELED EXTENET.
- 8. CONTRACTOR SHALL IMPLEMENT AN EROSION CONTROL PROGRAM DURING THE PROJECT CONSTRUCTION ACTIVITIES, THE PROGRAM SHALL MEET THE APPLICABLE REQUIREMENTS OF THE STATE WATER RESOURCE CONTROL
- 9. THE CONTRACTOR SHALL HAVE ENERGENCY MATERIALS AND EQUIPMENT ON HAND FOR UNFORESEEN STUATIONS, SUCH AS DAMAGE TO UNDERGROUND WATER, SEWER, AND STORM DRAIN FACILITIES WHEREBY FLOWS MAY GENERATE EROSION AND SEDIMENT POLLUTION.

CALTRANS NOTES

ANY REMOVED OR DAMAGED STRIPING AND MARKINGS SHALL BE REPLACED IN KIND AS PER CALTRANS STANDARDS AND AT PERMITTEE'S EXPENSE.



811 / 1-800-227-2600 www.usanorth.org

SPECIAL NOTES

- INDEMNIFICATION CLAUSE: THE CONTRACTOR AGREES AND SHALL:
 ASSUME SOLE AND COMPLETE RESPONSIBILITY OF THE JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING THE SAFETY OF ALL PERSONS AND PROPERTIES THAT THESE REQUIREMENTS SHALL APPLY CONTINUOUSLY AND NOT BE UNITED TO NORMAL WORKING HOURS AND CONDITIONS. THE CONTRACTOR FURTHER AGREES TO DEFEND INDEMNITY AND HOLD EXTENET, REPRESENTATIVES, AND ENGINEERS HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED IN CONNECTION WITH THE PERFORMANCE OF THE WORK ON THIS PROJECT.
- 2. PRIOR TO THE BEGINNING OF ANY CONSTRUCTION AND THROUGHOUT THE COURSE OF CONSTRUCTION WORK, THE CONTRACTOR SHALL FULLY COMPLY WITH "CALIFORNIA OCCUPATIONAL SAFETY AND HEALTH" ACT OF 1973 INCLUDING ALL REVISIONS AND AMENDMENTS THERETO.
- ALL WORK SHALL CONFORM TO THE LATEST EDITIONS OF GO95.128 AND THE STANDARD "SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION" AS ADOPTED BY THE CITY, COUNTY OR STATE AS MODIFIED BY STANDARD PLANS
- 4. THE EXISTENCE AND LOCATION OF UTILITIES AND OTHER AGENCY'S FACILITIES AS SHOWN HERON ARE OBTAINED BY A SEARCH OF AWALABLE RECORDS, OTHER FACILITIES MAY EXIST. THE CONTRACTOR SHALL VERFY PRIOR TO THE START OF CONSTRUCTION AND SHALL USE EXIGITED CARE AND PROTECTIVE HEASURES TO PREVENT DAMAGE TO THESE FACILITIES. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF A MEDICAL UTILITY OR AGENCY FACILITIES WITHIN THE LIMITS OF WORK, WHETHER THEY ARE SHOWN ON THIS PLAN OR NOT.
- 5. THE CONTRACTOR SHALL NOTIFY THE CITY, COUNTY OR STATE ENGINEER INSPECTION DEPARTMENT, AT LEAST TWO DAYS BEFORE START OF ANY WORK REQUIRING THEIR INVOLVEMENT.
- THE CITY, COUNTY OR STATE SHALL SPECIFY THE EXPIRATION PERIOD OF THE PERMIT FOR THIS CONSTRUCTION PROJECT.
- 7. THE MINIMUM COVER FOR ALL CONDUITS PLACED UNDERGROUND SHALL BE 30 INCHES TO THE FINISHED
- 8. THE CONTRACTOR SHALL TUNNEL ALL CURB AND GUTTERS AND BORE ALL CONCRETE DRIVEWAYS AND WALKWAYS AT THE DIRECTION OF THE CITY, COUNTY OR STATE ENGINEER.
- 9. ALL A.C. AND/OR CONCRETE PAVEMENT SHALL BE REPLACED AT THE DIRECTION OF THE CITY, COUNTY OF
- 10. ALL SHRUBS, PLANTS OR TREES THAT HAVE BEEN DAMAGED OR DISTURBED DURING THE COURSE OF THE
- WORK, SHALL BE REPLANTED AND/OR REPLACED SO AS TO RESTORE THE WORK SITE TO ITS ORIGINAL CONDITION.
- 11. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE PROCESSING OF ALL APPLICANT PERMIT FORMS ALONG WITH THE REQUIRED LIABILITY INSURANCE FORMS, CLEARLY DEMONSTRATING THAT EXTENET, THE CITY, COUNTY OR STATE IS ALSO INSURED WITH THE REQUIRED LABILITY INSURANCE IN THE AMOUNT OF \$1,000,000.00 FOR THIS CONSTRUCTION PROJECT.
- 12. VAULTS, PEDESTALS, CONDUITS AND OTHER TYPES OF SUBSTRUCTURE ARE EITHER SPECIFIED ON THIS PLAN OR WILL BE SPECIFIED BY THE CONSTRUCTION ENCONEER, ANY AND ALL DEVATIONS FROM THE SPECIFIED TYPES OF MATERIAL MUST BE APPROVED BY THE SYSTEM ENGINEER, IN WRITING BEFORE INSTALLATION THEREOF.
- I.S. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES IN INCLUDING SEWER LATERALS & WATER SERVICES TO INDIVIDUAL LOTS BOTH VERTICAL AND HORIZONTAL PRIOR TO COMMENCING IMPROVEMENT
- 14. CONTRACTOR SHALL MAKE EXPLORATION EXCAVATIONS AND LOCATE EXISTING FACILITIES SUFFICIENTLY AHEAD OF CONSTRUCTION TO PERMIT REVISIONS TO PLANS IF REVISION IS NECESSARY BECAUSE OF LOCATION OF
- 15. THE LOCATIONS OF ALL EXISTING UTILITIES SHOWN ON THESE PLANS ARE FROM EXISTING RECORDS AND CORROBORATED, WHERE POSSIBLE, WITH FIELD TIES, THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING THE LOCATIONS SHOWN, BOTH HORZONIAL AND VERTICALLY, PRIOR TO CONSTRUCTION, IF EXISTING LOCATIONS WARY SUBSTANTIALLY FROM THE PLANS, THE ENGINEER SHOULD BE NOTIFIED TO MAKE ANY CONSTRUCTION CHANGES

EROSION AND SEDIMENT CONTROL NOTES

TEMPORARY EROSION/SEDIMENT CONTROL PRIOR TO COMPLETION OF FINAL IMPROVEMENTS, SHALL BE PERFORMED HE CONTRACTOR OR QUALIFIED PERSON AS INDICATED BELOW:

- 1. ALL REQUIREMENTS OF THE CITY, COUNTY AND STATE "STORM WATER STANDARDS" MUST BE INCORPORATED INTO THE DESIGN AND CONSTRUCTION OF THE PROPOSED GRADING/IMPROVMENTS CONSISTENT WITH THE APPROVED STORM WATER POLLUTION PREVENTION PLAN (SWPPP), WATER QUALITY TECHNICAL REPORT (WQTR), AND/OR WATER POLLUTION CONTROL PLAN (WPCP).
- 2. FOR STORM DRAIN INLETS, PROVIDE A GRAVEL BAG SILT BASIN IMMEDIATELY UPSTREAM OF INLET AS
- 3. FOR INLETS LOCATED AT SUMPS ADJACENT TO TOP OF SLOPES, THE CONTRACTOR SHALL ENSURE THAT WATER DRAWING TO THE SUMP IS DIRECTED INTO THE INLET AND THAT A MINIMUM OF 1.00° FREEBOARD EXSIS AND IS MANTAINED ABOVE THE TOP OF THE INLET. IF FREEBOARD IS NOT PROVIDED BY GRADING SHOWN ON THESE PLANS THE CONTRACTOR SHALL PROVIDE IT VIA TEMPORARY MEASURES, I.E. GRAVEL BAGS OR DIKES.
- THE CONTRACTOR OR QUALIFIED PERSON SHALL BE RESPONSIBLE FOR CLEANUP OF SILT AND MUD ON ADJACENT STREET(S) AND STORM DRAIN SYSTEM DUE TO CONSTRUCTION ACTIVITY.
- 5. THE CONTRACTOR OR QUALIFIED PERSON SHALL CHECK AND MAINTAIN ALL LINED AND UNLINED DITCHES
- 6. THE CONTRACTOR SHALL REMOVE SILT AND DEBRIS AFTER EACH MAJOR RAINFALL
- 7. EQUIPMENT AND WORKERS FOR EMERGENCY WORK SHALL BE MADE AVAILABLE AT ALL TIMES DURING THE RAINY SEASON. ALL NECESSARY MATCHAS SHALL BE STOCKPILED ON STIE AT CONVENIENT LOCATIONS TO FEMERORARY DEVICES WHERE RAIN IS MININE
- 8. THE CONTRACTOR SHALL RESTORE ALL EROSION/SEDIMENT CONTROL DEVICES TO WORKING ORDER TO THE SATISFACTION OF THE CITY ENGINEER OF RESIDENT ENGINEER AFTER EACH RUN-OFF PRODUCING RANFALL.
- 9. THE CONTRACTOR SHALL INSTALL ADDITIONAL FROSION/SEDIMENT CONTROL MEASURES AS MAY BE REQUIRED HE RESIDENT ENGINEER DUE TO UNCOMPLETED GRADING OPERATIONS OR UNFORESEEN CIRCUMSTANCES,
- 10. THE CONTRACTOR SHALL BE RESPONSIBLE AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT PUBLIC TRESPASS ONTO AREAS WHERE IMPOUNDED WATERS CREATE A HAZARDOUS CONDITION.
- 11 ALL EROSION/SEDIMENT CONTROL MEASURES PROVIDED PER THE APPROVED GRADING PLAN SHALL BE IN THE ADMINISTRATE CONTINUE MEASURES PROVIDED FOR THE APPROVED GRADING PLAN SHALL BE INCORPORATED HERON, ALL EGOSION/SEDIMENT CONTROL FOR INTERIM CONDITIONS SHALL BE DONE TO THE SATISFACTION OF THE RESIDENT ENGINEER.
- 12. GRADED AREAS AROUND THE PROJECT PERIMETER MUST DRAIN AWAY FROM THE FACE OF THE SLOPE AT THE CONCLUSION OF EACH WORKING DAY.
- 13. ALL REMOVABLE PROTECTIVE DEVICES SHOWN SHALL BE IN PLACE AT THE END OF EACH WORKING DAY WHEN RAIN IS IMMINENT.
- 14. THE CONTRACTOR SHALL ONLY GRADE, INCLUDING CLEARING AND GRUBBING FOR THE AREAS FOR WHICH THE CONTRACTOR OR QUALIFIED PERSON CAN PROVIDE EROSION/SEDIMENT CONTROL MEASURES.
- 15. THE CONTRACTOR SHALL ARRANGE FOR WEEKLY MEETINGS DURING OCTOBER 1ST TO APRIL 30TH FOR PROJECT TEAM (GENERAL CONTRACTOR, QUALIFIED PERSON, EROSION CONTROL SUBCONTRACTOR IF AN, ENGINEER OF WORK OWNER/DEVELOPER AND THE RESIDENT ENGINEER) TO EVALUATE THE ADEQUACY OF THE EROSION/SEDIMENT CONTROL MEASURE AND OTHER RELATED CONSTRUCTION ACTIVITIES.

SCALE 2

GENERAL NOTES

ROW GROUND CONSTRUCTION NOTES:

- 120/240 POWER REQUIRED FOR 3-WIRE SERVICE.
- 1. 120/240 FOWER REQUIRED FOR 3-WIRE SERVICE. 1.
 2. GC TO REMOVE/CLEAN ALL DEBRIS, NAILS, STAPLES, OR NON-USED 2. VERTICALS OFF THE POLE.
 3. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH MUNICIPAL, COUNTY, STATE, FEDERAL, GO95 AND G0128 STANDARDS AND REGULATIONS. 4.
- REGULATIONS.
 A. CALL USA 48 HOURS PRIOR TO EXCAVATING AT (800) 227–2600.
 ALL LANDSCAPING TO BE RESTORED TO ORIGINAL CONDITION OR
- 6. ALL EQUIPMENT TO BE BONDED.
- 7. METERING CABINET REQUIRES 3' CLEARANCE AT DOOR OPENING. 8. CAULK CABINET BASE AT PAD.

- GROUND TESTED AT 5 OHMS OR LESS.
- 5/8"x8' ROD, CAD WELD BELOW GRADE #6 GROUND AND BOND WIRE.
- WOOD MOLDING, STAPLED EVERY 3' AND AT EACH END 5. GROUNDS 3' FROM POLE.
- 6. PLACE 3 #10GA WIRES FROM BREAKER TO METER BOX.

STANDARD CONDUIT NOTES:

- FOR UNDERGROUND USE SCHEDULE 40.
- 1. FOR UNDERGROUND USE SCHEDULE 40.
 2. FOR RISERS USE SCHEDULE 80.
 3. PLACE 2" GALVANIZED STEEL CONDUIT FOR ANY CONDUIT UNDER 3", STUB UP 10' THEN CONVERT TO SCHEDULE 80.
 4. CONVERT 4" CARRIER CONDUIT TO 3" AT BASE OF POLE.

- T. CANTILLY CANTILL CUNDULL 10 37 AL BASE OF POLE.

 5. CC TO STUB UP POLE 10" 9/3" POWER CONDULT, POWER CO. TO

 CONVERT FROM 3" SCH. 80 TO 2" SCH. 80 FROM TOP OF STUB UP.

 6. ALL CONDULT WILL BE MAN DRILLED AND EQUIPPED WITH 3/8" PULL ROPE.

STANDARD TRENCHING NOTES:

- MAINTAIN 40" MINIMUM COVER FOR ELECTRICAL CONDUIT.
- SAND SHADING MINIMUM 1" UNDER CONDUITS, AND 6" COVERING ON TOP REQUIRED.
- 4. ALL ELECTRICAL SERVICE CONDUITS FROM POWER COMPANY, WHETHER FROM POLES, TRANSFORMERS, OR OTHER LOCATIONS; WILL BE SLURRY

- BACKFILLED.

 5. IN STREET SLURRY TO GRADE AND MILL DOWN 1-1/2" FOR AC CAP.

 6. IN DIRT SLURRY 18" FROM GRADE, AND FILL WITH 95% COMPACTION NATIVE SOIL FOR BALANCE.

 7. PLACE WARNING TAPE IN TRENCH 12" ABOVE ALL CONDUITS AND #18 WARNING TAPE ABOVE GROUND RING.

ROW UTILITY POLE CONSTRUCTION NOTES: NO BOLT THREADS TO PROTRUDE MORE THAN 1-1/2". FILL ALL HOLES LEFT IN POLE FROM REARRANGEMENT OF

- 3. ALL CLIMB STEPS NEXT TO CONDUIT SHALL HAVE EXTENDED 4. CABLE NOT TO IMPEDE 15" CLEAR SPACE OFF POLE FACE
- (12:00).
 5. 90' SHORT SWEEPS UNDER ANTENNA ARM. ALL CABLES MUST
- 5. 90 SHORT SWEEP'S UNDER MYTENIA ARM. ALL CABLES MYS ONLY TRANSITION ON THE INSIDE OR BOTTOM OF ARMS (NO CABLE ON TOP OF ARMS).

 6. USE CABLE CLAMPS TO SECURE CABLE TO ARMS, PLACE 2" CARRIER CABLE ID TAGS ON BOTH SIDES OF ARMS.

 7. USE 90' CONNECTOR AT CABLE CONNECTION TO ANTENNAS.

 8. PLACE GPS ON ARM WITH SOUTHERN SKY EXPOSURE AT PLACE BY TOWN THE SOUTHERN SKY EXPOSURE AT
- MINIMUM 6' FROM TRANSMIT ANTENNA, WHICH IS 24" AWAY FROM CENTER OF POLE.
- 9. USE 1/2" CABLE ON ANTENNAS UNLESS OTHERWISE SPECIFIED.

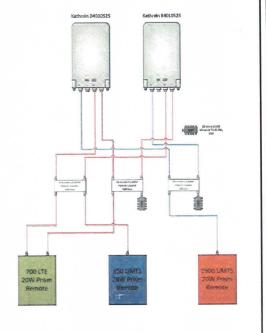
 10. FILL YOUD AROUND CABLES AT CONDUIT OPENING WITH FOAM SEALANT TO PREVENT WATER INTRUSION.
- 31'-11" TOP GRADE 29'-0" BOTTOM GRAD METER/BREAKER AREA TOTAL 14.62 SQ. FT. 8'-11" TOP GRADE 8'-0" BOTTOM GRADI BATTERY BACK-UP IN SHROUD AREA TOTAL TOP GRADE BOTTOM GRADI IN SHROUD TOP GRADE BOTTOM GRADE FOUIPMENT SHROUD 192 SQ. FT. AREA TOTAL 18'-10" TOP GRADE 10'-10" BOTTOM GRADE 3"11 COAX RISER SIZE 28'-6"/10'-0" COAX RISER TOP GRADE COAX RISER BTM GRADE 0'-0"/0'-0" 1"ø PWR RISER SIZE 8'-0"/30'-11 PWR RISER TOP GRADE

WIND LOADING INFORMATION

39.02 SQ. FT.

ANTENNA/WOOD ARM AREA

ANTENNA SECTOR	AZIMUTH	ANTENNA MAKE / MODEL	COAXIAL CABLE LENGTH	CABLES PER SECTOR	SIZE
SECTOR ALPHA	30*	KATHREIN 840-10525	80'/3'	4/6	1/2"
SECTOR BETA	105*	KATHREIN 840-10525			
SECTOR GAMMA					



SCALE NTS



NEW CINGULAR WIRELESS PCS, LLC 4430 ROSEWOOD DR, BLDG 3 PLEASANTON, CA 94588-3050

PROJECT INFORMATION:

OAKHILLS AT&T SOUTH NETWORK NODE 046B 1265 MOUNTAIN BLVD OAKLAND, CA 94611

CURRENT ISSUE DATE:

/14/14

ISSUED FOR:

ZONING

ACI	11/14/14	EQUIPMENT POLE CHANGE OUT	3
ACI	10/06/14	STRUCTURAL ADDJUSTMENTS	2
ACI	10/17/13	SPLIT POLE CONFIG	1
ACI	12/14/12	ZDs	C
BY	DATE	DESCRIPTION	REV

PLANS PREPARED BY:



ACI NUMBER:



lisle. | 60532 www.extenet.com

SEAL OF APPROVAL: SHEET TITLE: =

SHEET NUMBER:

GENERAL NOTES AND SCHEDULES

11/14/14

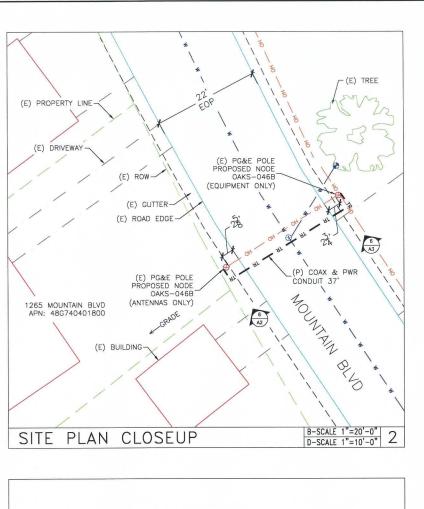
REVISION:

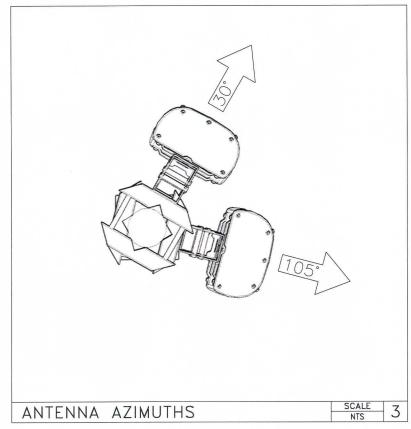
ROW CONSTRUCTION GENERAL NOTES

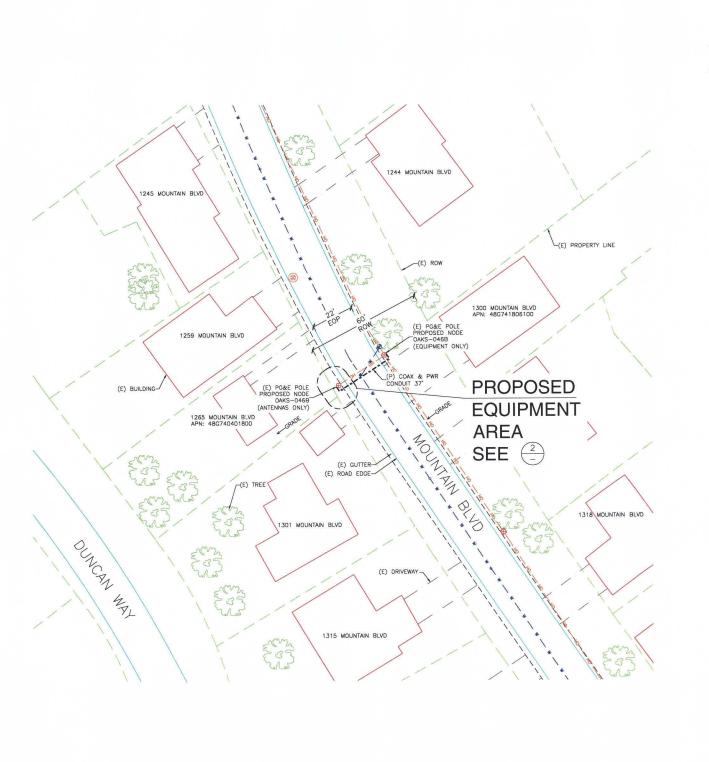
PWR RISER BTM GRADE

LOADING AND ANTENNA CABLE SCHEDULES

0'-0"/8'-0"









NEW CINGULAR WIRELESS PCS, LLC 4430 ROSEWOOD DR, BLDG 3 PLEASANTON, CA 94588-3050

=PROJECT INFORMATION: =

OAKHILLS AT&T South Network NODE 046B

1265 MOUNTAIN BLVD OAKLAND, CA 94611

CURRENT ISSUE DATE: =

ISSUED FOR: =

ZONING

BY: = DATE: = DESCRIPTION: === REV: ACI 11/14/14 EQUIPMENT POLE CHANGE OUT ACI 10/06/14 STRUCTURAL ADDJUSTMENTS ACI 10/17/13 SPLIT POLE CONFIG ACI 12/14/12 BY DATE DESCRIPTION

PLANS PREPARED BY:



ACI NUMBER:

CONSTRUCTED BY:=

net

3030 Warrenville Rd, Suite 340 Lisle, IL 60532 www.extenet.com

SEAL OF APPROVAL: =

SHEET TITLE:

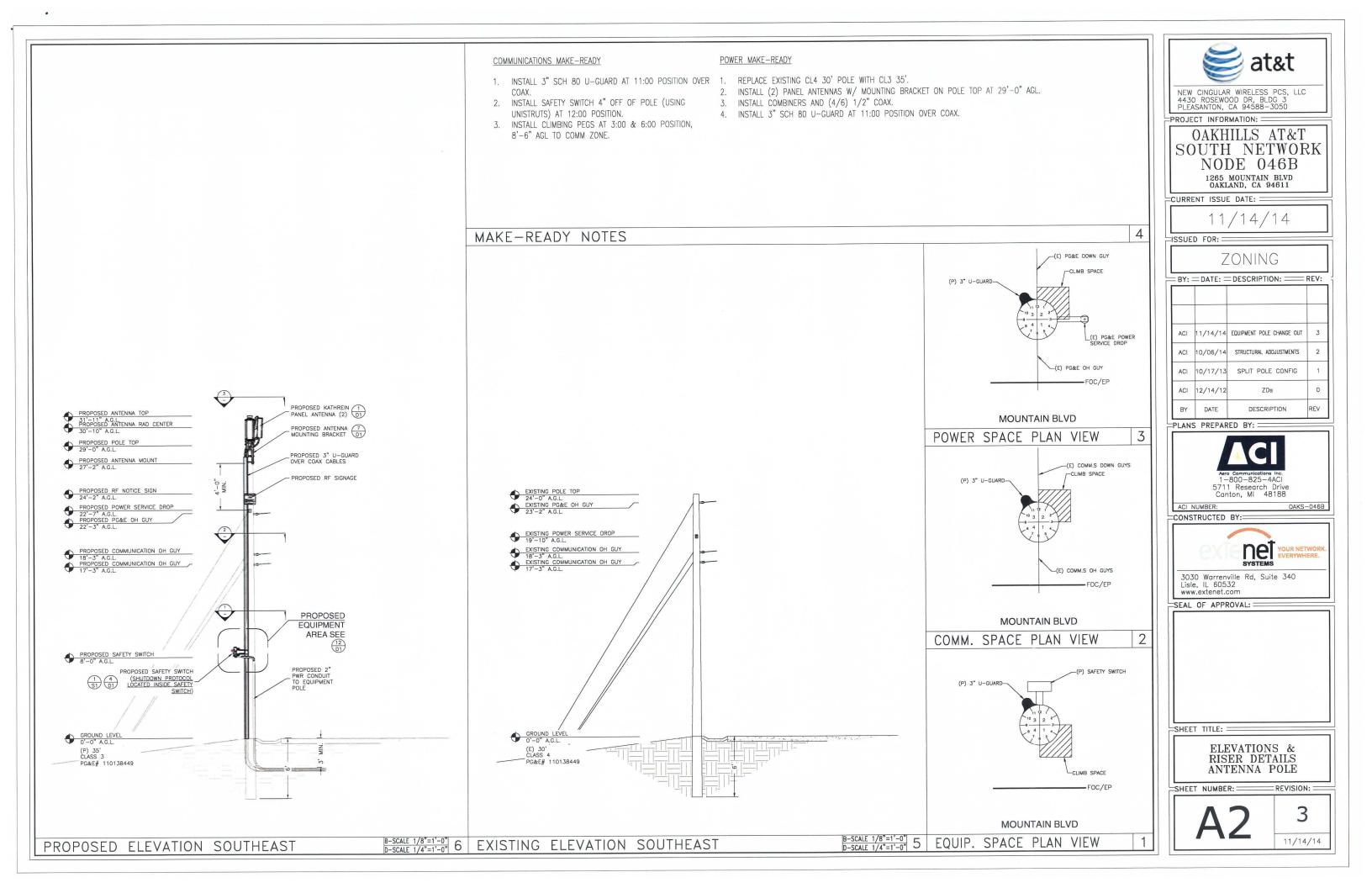
SITE PLAN

SHEET NUMBER: =REVISION: =

3 11/14/14

SITE PLAN

B-SCALE 1"=50'-0" D-SCALE 1"=25'-0"

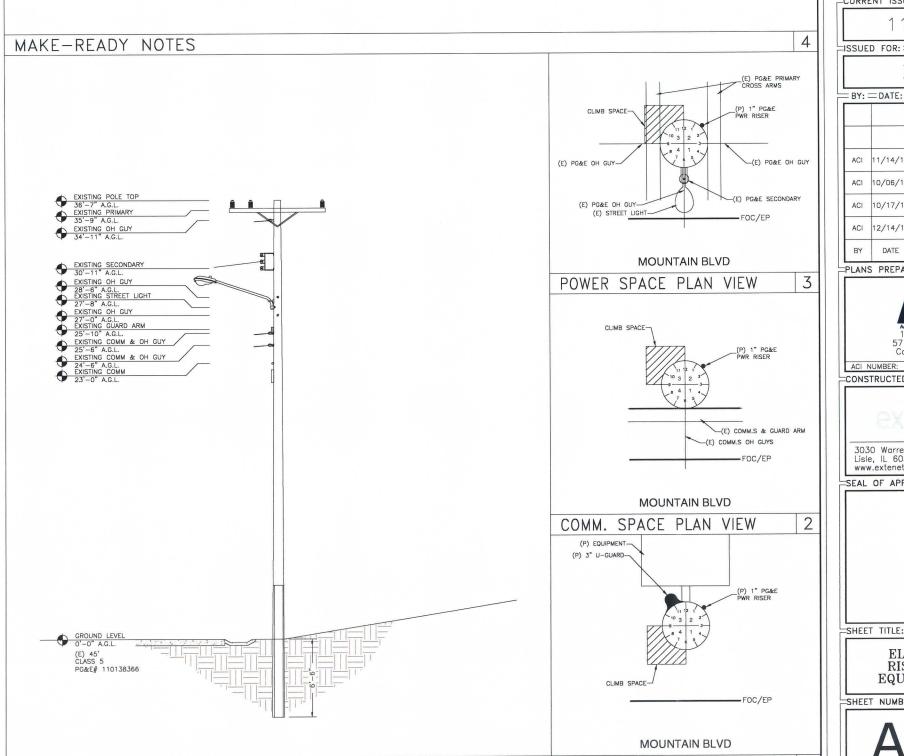


COMMUNICATIONS MAKE-READY

- 1. INSTALL PG&E 1" SCH 80 CONDUIT AT 1:30 POSITION FOR POWER SERVICE.
- 2. INSTALL COMBINERS AND (4/6) 1/2" COAX.
- 4. INSTALL SHROUD (RADIO & BBU), METER SOCKET, & SAFETY SWITCH 4" OFF OF POLE (USING UNISTRUTS) AT 6:00 POSITION.

POWER MAKE-READY

- 1. REPLACE EXISTING CL5 45' POLE WITH CL3 50' FOR BETTERMENT.
- INSTALL PG&E WEATHER HEAD AND 1" SCH 80 CONDUIT AT 1:30 POSITION FOR POWER SERVICE.
- INSTALL 3" SCH 80 U-GUARD AT 11:00 POSITION OVER 3. PROVIDE 120/240 3-WIRE SINGLE PHASE, 100 AMP SERVICE TO 1" PG&E CONDUIT AT 1:30 POSITION TO METER SOCKET FROM SECONDARY 30'-11" AGL.





NEW CINGULAR WIRELESS PCS, LLC 4430 ROSEWOOD DR, BLDG 3 PLEASANTON, CA 94588-3050

PROJECT INFORMATION: =

OAKHILLS AT&T SOUTH NETWORK NODE 046B 1265 MOUNTAIN BLVD OAKLAND, CA 94611

CURRENT ISSUE DATE: =

11/14/14

ZONING

ACI	11/14/14	EQUIPMENT POLE CHANGE OUT	3
ACI	10/06/14	STRUCTURAL ADDJUSTMENTS	2
ACI	10/17/13	SPLIT POLE CONFIG	1
ACI	12/14/12	ZDs	0

DESCRIPTION

REV

PLANS PREPARED BY:

BY DATE



ACI NUMBER CONSTRUCTED BY:=



SEAL OF APPROVAL: =



ELEVATIONS & RISER DETAILS EQUIPMENT POLE

11/14/14

REVISION: SHEET NUMBER: 3

PROPOSED ELEVATION SOUTHEAST

PROPOSED 3" U-GUARD OVER COAX CABLES

PROPOSED POLE TOP PROPOSED PRIMAR 42'-1" A.G.L. PROPOSED OH GUY
41'-3" A.G.L.

PROPOSED SECONDARY
34'-9" A.G.L.

PROPOSED OH GUY

28'-6" A.G.L.

PROPOSED STREET LIGHT

27'-8" A.G.L.

PROPOSED OH GUY -0" A.G.L. POSED GUARD ARM

PROPOSED COMM & OH GUY
24'-6" A.G.L.
PROPOSED COMM & OH GUY
23'-6" A.G.L.
PROPOSED COMM
22'-6" A.G.L.

PROPOSED EQUIPMENT SHROUD

10'-10" A.G.L.

PROPOSED METER/SAFETY SWITCH 8'-0" A.G.L.

GROUND LEVE

PG&E# 110138366

PROPOSED EQUIPMENT SHROUD 96"X24"X24"

PROPOSED EQUIPMENT

AREA SEE

PROPOSED METER SOCKET 5
AND SAFETY SWITCH D1

B

B-SCALE 1/8"=1'-0" 6 EXISTING ELEVATION SOUTHEAST

B-SCALE 1/8"=1'-0" 5 EQUIP. SPACE PLAN VIEW

SHUTDOWN PROTOCOL 7"X9" LAMINATED CARD CARDSTOCK



AT&T oDAS Shutdown Procedure

PROCEDURE TO DE-ENERGIZE RADIO FREQUENCY (RF) SIGNAL EMERGENCY and NON-EMERGENCY WORK REQUIRING RF SIGNAL SHUTDOWN

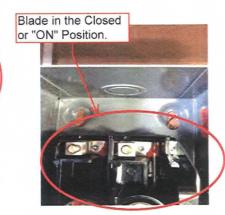
- (A) PG&E personnel SHALL contact AT&T Mobility Switch Center to notify them of an emergency shutdown 800-638-2822. Dial option 9 for cell site "Related" emergency's then option 1. Provide the following information when calling or leave a voicemail:
- (1) Identify yourself and give callback phone number.
- (2) Site number and if applicable site name (located on the shutdown box)
- (3) Site address and location
- (4) Nature of emergency and site condition
- (B) Pull Disconnect Handle down to the Open or "OFF" Position. The RF signal will shut down within a few seconds. A visual inspection of the interior blade will confirm that both incoming AC Lead and Battery Backup are disconnected.
- (C) Notify AT&T (New Cingular) Switch Center when the emergency work is completed.

See reverse side to view photo of the "on" and "off" position.



Switch in the Closed Position ("ON")





Switch in the Open Position ("Off")







NEW CINGULAR WIRELESS PCS, LLI 4430 ROSEWOOD DR, BLDG 3 PLEASANTON, CA 94588-3050

PROJECT INFORMATION: =

OAKHILLS AT&T SOUTH NETWORK NODE 046B

1265 MOUNTAIN BLVD OAKLAND, CA 94611

CURRENT ISSUE DATE: =

11/14/14

ISSUED FOR:

70NING

ACI	11/14/14	EQUIPMENT POLE CHANGE OUT	3
ACI	10/06/14	STRUCTURAL ADDJUSTMENTS	2
ACI	10/17/13	SPLIT POLE CONFIG	1
ACI	12/14/12	ZDs	0
BY	DATE	DESCRIPTION	REV

-PLANS PREPARED BY:



CONSTRUCTED BY:=



3030 Warrenville Rd, Suite 340 Lisle, IL 60532 www.extenet.com

- 1	SEAL	OF	AFFRUVAL

SHEET TITLE: =

POWER & RF SAFETY PROTOCOLS

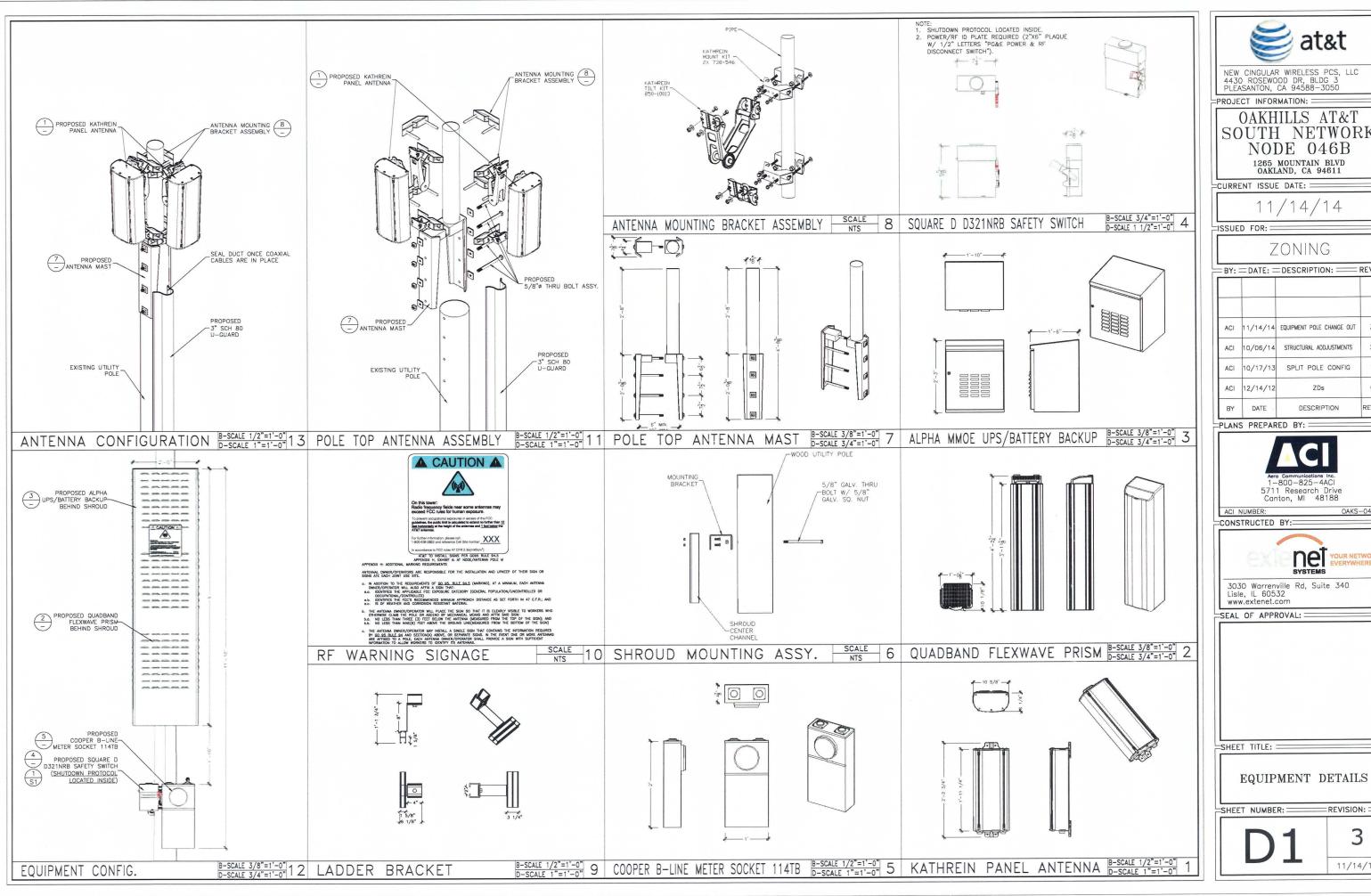
SHEET NUMBER: REVISION:

S1

11/14/14

FRONT

BACK





OAKHILLS AT&T SOUTH NETWORK NODE 046B

BY: = DATE: = DESCRIPTION: === REV: ACI 11/14/14 EQUIPMENT POLE CHANGE OUT SPLIT POLE CONFIG DESCRIPTION





REVISION: =

3 11/14/14

AT&T Mobility Radio Frequency Statement DAS Node 46: Existing Utility Pole in Public Right-of-Way Near 1265 Mountain Blvd., Oakland, CA

I am the AT&T radio frequency engineer assigned to the proposed wireless telecommunications facility ("Node 46"), which is a distributed antenna system ("DAS") node to be located on an existing utility pole in the public right-of-way near 1265 Mountain Boulevard, Oakland (the "Property"). Based on my personal knowledge of the Property and with AT&T's wireless network, as well as my review of AT&T's records with respect to the Property and its wireless telecommunications facilities in the surrounding area, I have concluded that the work associated with this permit request is needed to close a service coverage gap in the area immediately surrounding the Property.

The service coverage gap is caused by inadequate infrastructure in the area. As explained further in Exhibit 1, AT&T's existing facilities cannot adequately serve its customers in the desired area of coverage, let alone address rapidly increasing data usage. Moreover, 4G LTE service coverage has not yet been fully deployed in this area. To remedy this service coverage gap, AT&T needs to construct a new wireless telecommunications facility.

AT&T uses industry standard propagation tools to identify the areas in its network where signal strength is too weak to provide reliable in-building service quality. This information is developed from many sources including terrain and clutter databases, which simulate the environment, and propagation models that simulate signal propagation in the presence of terrain and clutter variation. AT&T designs and builds its network to ensure customers receive reliable in-building service quality.

Exhibit 2 to this Statement is a map of the existing service coverage (without Node 46) in the area at issue. It includes service coverage provided by existing AT&T sites. The green shaded areas depict areas within a signal strength range that provide acceptable in-building service coverage. In-building coverage means customers are able to place or receive a call on the ground floor of a building. The yellow shaded areas depict areas within a signal strength range that provide acceptable in-vehicle coverage. In this area, an AT&T customer should be able to successfully place or receive a call within a vehicle. The blue shading depicts areas within a signal strength range in which a customer might have difficulty receiving a consistently acceptable level of service. The quality of service experienced by any individual can differ greatly depending on whether that customer is indoors, outdoors, stationary, or in transit. Any area in the blue or yellow category is considered inadequate service coverage and constitutes a service coverage gap.

Exhibit 3 predicts service coverage in the vicinity of the Property if the Node 46 antennas are placed as proposed in the application. As shown by this map, placement of Node 46 closes the significant 3G service coverage gap in the area immediately surrounding the Property.

In addition to these 3G wireless service gap issues, AT&T is in the process of deploying its 4G LTE service in Oakland with the goal of providing the most advanced personal wireless experience available to residents of the City. 4G LTE is capable of delivering speeds up to 10 times faster than industry-average 3G speeds. LTE technology also offers lower latency, or the processing time it takes to move data through a network, such as how long it takes to start downloading a webpage or file once a customer has sent the request. Lower latency helps to improve the quality of personal wireless services. What's more, LTE uses spectrum more efficiently than other technologies, creating more space to carry data traffic and services and to deliver a better overall network experience.

Exhibit 4 is a map that depicts 4G LTE service in the area surrounding the Property, and it shows a significant 4G LTE service coverage gap in the area. Exhibit 5 shows that after Node 46 is on air, 4G LTE service is available both indoors and outdoors in the area. This is important not only to bring 4G LTE to residents of Oakland but also because as existing customers migrate to 4G LTE, the LTE technology will provide the added benefit of reducing 3G data traffic, which can cause capacity issues on the UMTS (3G) network during peak usage periods, especially in light of the forecasted increase in usage noted in Exhibit 1.

I have a Bachelor's Degree in Electrical Engineering from Concordia University, and I have worked as a radio frequency design engineer in the wireless communications industry for over 7 years.

Dimitri Gogas

February 7, 2014

EXHIBIT 1 Prepared by AT&T Mobility

AT&T's digital wireless technology converts voice or data signals into a stream of digits to allow a single radio channel to carry multiple simultaneous signal transmissions. This technology allows AT&T to offer services such as secured transmissions and enhanced voice, high-speed data, texting, video conferencing, paging and imaging capabilities, as well as voicemail, visual voicemail, call forwarding and call waiting that are unavailable in analog-based systems. With consumers' strong adoption of smartphones, customers now have access to wireless broadband applications, which consumer utilize at a growing number.

AT&T customers are using these applications in a manner that has caused a 30,000% increase in mobile data usage on AT&T's network since 2007. AT&T expects total mobile data volume to grow 8x-10x over the next five years. To put this estimate in perspective, all of AT&T Mobility's mobile traffic during 2010 would be equal to only six or seven weeks of mobile traffic volume in 2015. The FCC noted that U.S. mobile data traffic grew almost 300% in 2011, and driven by 4G LTE smartphones and tablets, traffic is projected to grow an additional 16-fold by 2016.

Mobile devices using AT&T's technology transmit a radio signal to antennas mounted on a tower, pole, building, or other structure. The antenna feeds the signal to electronic devices housed in a small equipment cabinet, or base station. The base station is connected by microwave, fiber optic cable, or ordinary copper telephone wire to the Radio Network Controller, subsequently routing the calls and data throughout the world.

The operation of AT&T's wireless network depends upon a network of wireless communications facilities. The range between wireless facilities varies based on a number of factors. The range between AT&T mobile telephones and the antennas in and nearby Oakland, for example, is particularly limited as a result of topographical challenges, blockage from buildings, trees, and other obstructions as well as the limited capacity of existing facilities.

To provide effective, reliable, and uninterrupted service to AT&T customers in their cars, public transportation, home, and office, without interruption or lack of access, coverage must overlap in a grid pattern resembling a honeycomb.

In the event that AT&T is unable to construct or upgrade a wireless communications facility within a specific geographic area, so that each site's coverage reliably overlaps with at least one adjacent facility, AT&T will not be able to provide adequate personal wireless service to its customers within that area. Some consumers will experience an abrupt loss of service. Others will be unable to obtain reliable service, particularly if they are placing a call inside a building.

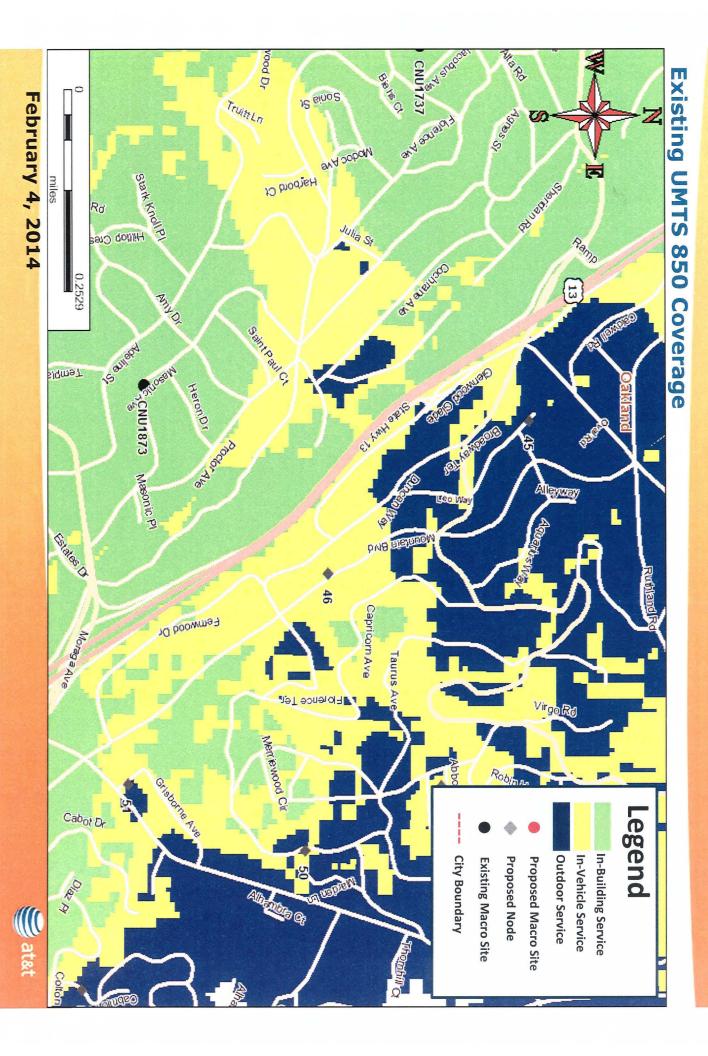
Service problems occur for customers even in locations where the coverage maps on AT&T's "Coverage Viewer" website appear to indicate that coverage is available. As the legend to the Coverage Viewer maps indicates, these maps depict a high-level *approximation* of coverage, which may not show gaps in coverage; *actual* coverage in an area may differ substantially from map graphics, and may be affected by such things as terrain, foliage, buildings and other construction, motion, customer equipment, and network traffic. The legend states that AT&T does not guarantee coverage and its coverage maps are not intended to show actual customer performance on the network, nor are they intended to show future network needs or build requirements inside or outside of AT&T's existing coverage areas.

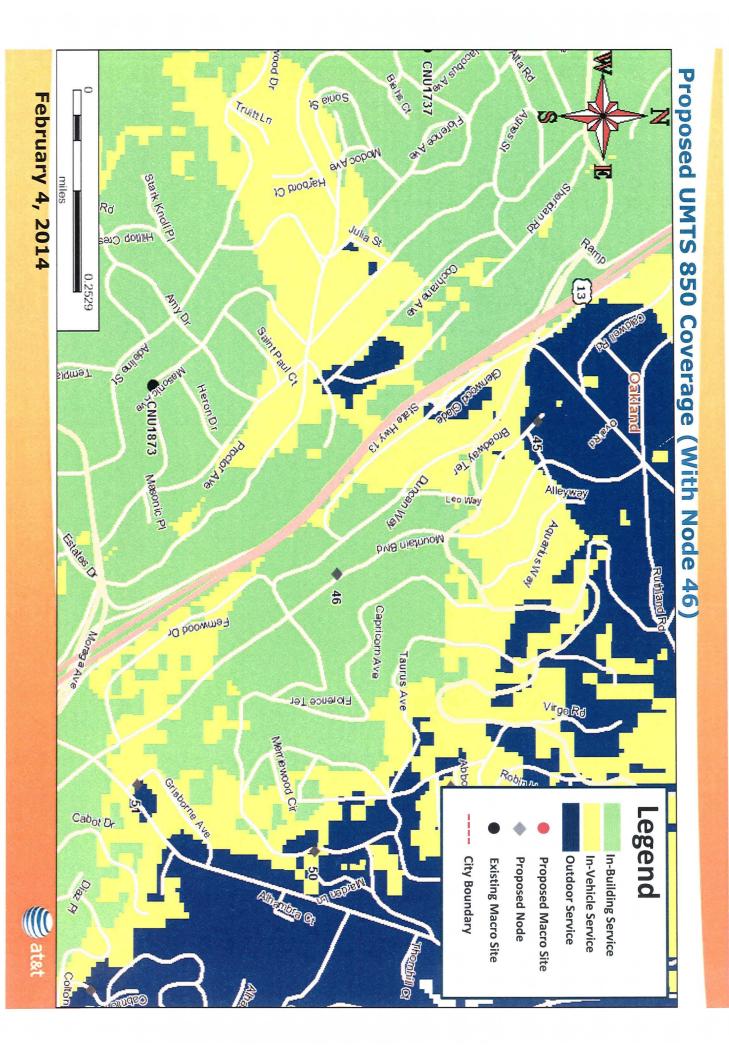
It is also important to note that the signal losses and service problems described above can and do occur for customers even at times when certain other customers in the same vicinity may be able to initiate and complete calls on AT&T's network (or other networks) on their wireless phones. These problems also can and do occur even when certain customers' wireless phones indicate "all bars" of signal strength on the handset.

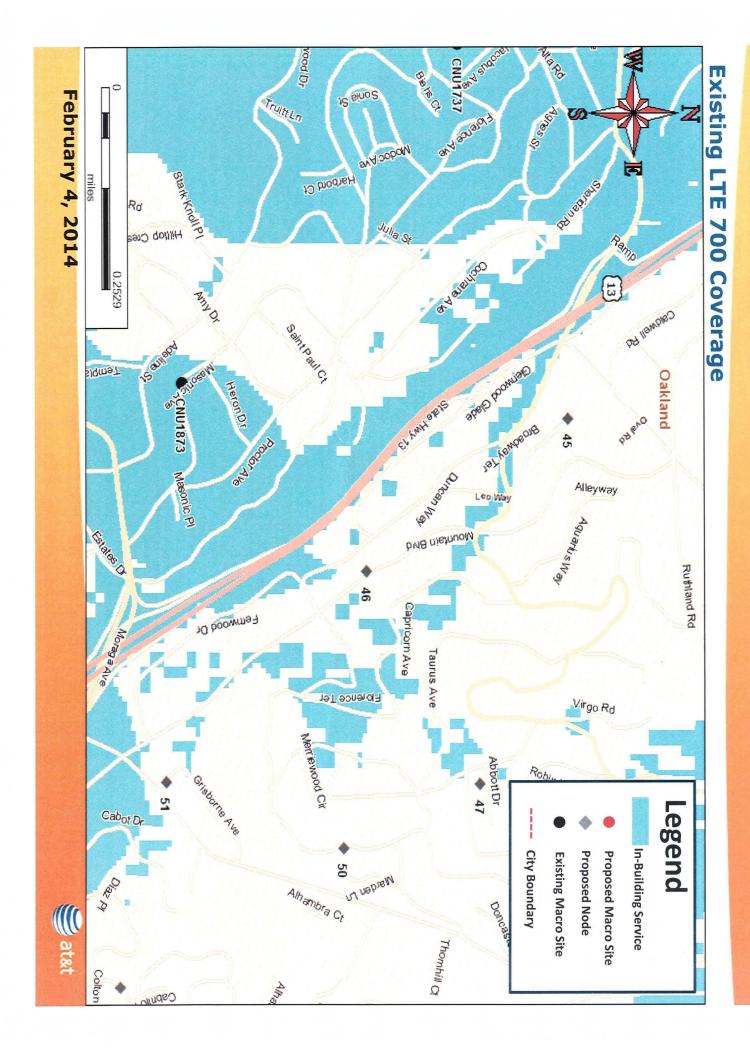
The bars of signal strength that individual customers can see on their wireless phones are an imprecise and slow-to-update estimate of service quality. In other words, a customer's wireless phone can show "four bars" of signal strength, but that customer can still, at times, be unable to initiate voice calls, complete calls, or download data reliably and without service interruptions.

To determine where new or upgraded telecommunications facilities need to be located for the provision of reliable service in any area, AT&T's radio frequency engineers rely on far more complete tools and data sources than just signal strength from individual phones. AT&T creates maps incorporating signal strength that depict existing service coverage and service coverage gaps in a given area.

To rectify this significant gap in its service coverage, AT&T needs to locate a wireless facility in the immediate vicinity of the Property.







AT&T Mobility • 32 Proposed Distributed Antenna System Nodes Oakland Hills • Oakland, California

Statement of Hammett & Edison, Inc., Consulting Engineers

The firm of Hammett & Edison, Inc., Consulting Engineers, has been retained on behalf of AT&T Mobility a wireless telecommunications service provider, to evaluate 32 distributed antenna system (DAS) nodes proposed to be located in the Oakland Hills area of Oakland, California, for compliance with appropriate guidelines limiting human exposure to radio frequency ("RF") electromagnetic fields.

Executive Summary

AT&T Mobility proposes to install two directional panel antennas on 32 existing or proposed utility poles sited in the Oakland Hills area of Oakland. The proposed operation will comply with the FCC guidelines limiting public exposure to RF energy.

Prevailing Exposure Standards

The U.S. Congress requires that the Federal Communications Commission ("FCC") evaluate its actions for possible significant impact on the environment. A summary of the FCC's exposure limits is shown in Figure 1. These limits apply for continuous exposures and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health. The most restrictive FCC limit for exposures of unlimited duration to radio frequency energy for several personal wireless services are as follows:

Wireless Service	Frequency Band	Occupational Limit	Public Limit
Microwave (Point-to-Point)	5,000-80,000 MHz	5.00 mW/cm^2	1.00 mW/cm^2
BRS (Broadband Radio)	2,600	5.00	1.00
AWS (Advanced Wireless)	2,100	5.00	1.00
PCS (Personal Communication) 1,950	5.00	1.00
Cellular	870	2.90	0.58
SMR (Specialized Mobile Radi	o) 855	2.85	0.57
700 MHz	700	2.35	0.47
[most restrictive frequency rang	ge] 30–300	1.00	0.20

Power line frequencies (60 Hz) are well below the applicable range of these standards, and there is considered to be no compounding effect from simultaneous exposure to power line and radio frequency fields.

General Facility Requirements

Base stations typically consist of two distinct parts: the electronic transceivers (also called "radios" or "channels") that are connected to the traditional wired telephone lines, and the passive antennas that send the wireless signals created by the radios out to be received by individual subscriber units. The transceivers are often located at ground level and are connected to the antennas by coaxial cables.



AT&T Mobility • 32 Proposed Distributed Antenna System Nodes Oakland Hills • Oakland, California

A small antenna for reception of GPS signals is also required, mounted with a clear view of the sky. Because of the short wavelength of the frequencies assigned by the FCC for wireless services, the antennas require line-of-sight paths for their signals to propagate well and so are installed at some height above ground. The antennas are designed to concentrate their energy toward the horizon, with very little energy wasted toward the sky or the ground. Along with the low power of such facilities, this means that it is generally not possible for exposure conditions to approach the maximum permissible exposure limits without being physically very near the antennas.

Computer Modeling Method

The FCC provides direction for determining compliance in its Office of Engineering and Technology Bulletin No. 65, "Evaluating Compliance with FCC-Specified Guidelines for Human Exposure to Radio Frequency Radiation," dated August 1997. Figure 2 attached describes the calculation methodologies, reflecting the facts that a directional antenna's radiation pattern is not fully formed at locations very close by (the "near-field" effect) and that at greater distances the power level from an energy source decreases with the square of the distance from it (the "inverse square law"). The conservative nature of this method for evaluating exposure conditions has been verified by numerous field tests.

Site and Facility Description

Based upon information provided by AT&T, that carrier proposes to install 32 new nodes, listed in Table 1 below, in the Oakland Hills area of Oakland. Each node would consist of two Kathrein Model 840-10525 directional panel antennas installed on a new or existing utility pole to be sited in a public right-of-way. The antennas would be mounted with no downtilt at an effective height of at least 31 feet above ground and would be oriented in different directions, as shown in Table 1. The maximum effective radiated power in any direction would be 219 watts, representing simultaneous operation by AT&T at 104 watts for PCS, 61 watts for cellular, and 54 watts for 700 MHz service. There are reported no other wireless telecommunications base stations at the site or nearby.

AT&T Mobility • 32 Proposed Distributed Antenna System Nodes Oakland Hills • Oakland, California

Node#	Approximate Address		tenna ntations	Antenna Height Above Ground
035B	Grizzly Peak Boulevard and Golf Course Drive	116°T	321°T	42 ft
03A6	2501 Grizzly Peak Boulevard	65°T	248°T	35
037B	7541 Claremont Avenue	54°T	240°T	44
039A	8071 Claremont Avenue	36°T	215°T	48
041A	Grizzly Peak Boulevard and Skyline Boulevard	149°T	283°T	50
042A	6616 Pine Needle Drive	73°T	344°T	45
046B	1265 Mountain Boulevard	30°T	105°T	31
047A	5925 Sherwood Drive	13°T	285°T	34
048A	Skyline Boulevard and Elverton Drive	153°T	325°T	54
049A	1732 Indian Way	24°T	306°T	45
050A	5612 Merriewood Drive	46°T	110°T	45
051B	5658 Grisborne Avenue	87°T	355°T	45
052B	5826 Mendoza Drive	61°T	121°T	45
053B	6133 Snake Road	43°T	119°T	45
054C	2040 Tampa Avenue	0°T	100°T	49
055C	2400 Manzanita Drive	80°T	160°T	36
056A	6837 Aitken Drive	65°T	316°T	34
057C	6433 Westover Drive	137°T	302°T	47
058B	6758 Saroni Drive	5°T	85°T	47
059B	2181 Andrews Street	37°T	88°T	49
060B	5879 Scarborough Drive	33°T	81°T	45
062A	2997 Holyrood Drive	21°T	88°T	45
063B	2679 Mountain Gate Way	0°T	80°T	35
064E	10 El Patio Street	29°T	110°T	47
070C	95 Castle Park Way	$0^{\circ}T$	70°T	45
071A	3343 Crane Way	72°T	355°T	46
074A	6925 Pinehaven Road	0°T	70°T	38
075B	6776 Thornhill Drive	66°T	127°T	45
077A	6659 Girvin Drive	100°T	180°T	45
078A	7380 Claremont Avenue	55°T	200°T	45
079B	6757 Sobrante Road	70°T	159°T	45
081A	Shepherd Canyon Road and Escher Drive	56°T	209°T	31
Table 1. Λ	Iew Cingular Wireless Nodes Evaluated			,

Study Results

For a person anywhere at ground, the maximum RF exposure level due to the proposed operation through is calculated to be 0.0036 mW/cm^2 , which is 0.69% of the applicable public exposure limit. The maximum calculated level at the second-floor elevation of any nearby building* is 3.2% of the

^{*} Including nearby residences located at least 9 feet from any pole, based on photographs from Google Maps.



AT&T Mobility • 32 Proposed Distributed Antenna System Nodes Oakland Hills • Oakland, California

public limit. It should be noted that these results include several "worst-case" assumptions and therefore are expected to overstate actual power density levels from the proposed operation.

Recommended Mitigation Measures

Due to their mounting locations on utility poles, the AT&T antennas would not be accessible to the general public, and so no mitigation measures are necessary to comply with the FCC public exposure guidelines. To prevent occupational exposures in excess of the FCC guidelines, it is recommended that access near the antennas be limited to authorized personnel who have been adequately trained in RF safety and awareness. No access within 3 feet directly in front of the antennas themselves, such as might occur during maintenance work on the poles, should be allowed while the pertinent node is in operation, unless other measures can be demonstrated to ensure that occupational protection requirements are met. Posting explanatory signs[†] at the antennas and/or on the poles below the antennas, such that the signs would be readily visible from any angle of approach to persons who might need to work within that distance, would be sufficient to meet FCC-adopted guidelines.

Conclusion

Based on the information and analysis above, it is the undersigned's professional opinion that the proposed operation of these AT&T Mobility nodes located in Oakland, California, will comply with the prevailing standards for limiting public exposure to radio frequency energy and, therefore, will not for this reason cause a significant impact on the environment. The highest calculated level in publicly accessible areas is much less than the prevailing standards allow for exposures of unlimited duration. This finding is consistent with measurements of actual exposure conditions taken at other operating base stations. Training of authorized personnel and posting explanatory signs is recommended to establish compliance with occupational exposure limitations.

Signs should comply with OET-65 color, symbol, and content recommendations. Signage may also need to comply with the requirements of California Public Utilities Commission General Order No. 95.



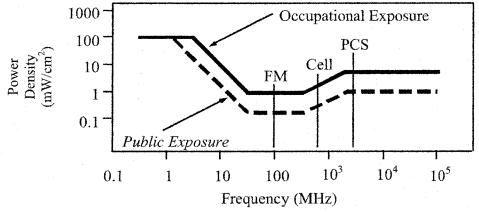
HAMMETT & EDISON, INC. CONSULTING ENGINEERS SAN FRANCISCO

FCC Radio Frequency Protection Guide

The U.S. Congress required (1996 Telecom Act) the Federal Communications Commission ("FCC") to adopt a nationwide human exposure standard to ensure that its licensees do not, cumulatively, have a significant impact on the environment. The FCC adopted the limits from Report No. 86, "Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields," published in 1986 by the Congressionally chartered National Council on Radiation Protection and Measurements ("NCRP"). Separate limits apply for occupational and public exposure conditions, with the latter limits generally five times more restrictive. The more recent standard, developed by the Institute of Electrical and Electronics Engineers and approved as American National Standard ANSI/IEEE C95.1-2006, "Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz," includes similar limits. These limits apply for continuous exposures from all sources and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health.

As shown in the table and chart below, separate limits apply for occupational and public exposure conditions, with the latter limits (in *italics* and/or dashed) up to five times more restrictive:

Frequency	Electromagnetic Fields (f is frequency of emission in MHz)					
Applicable Range (MHz)	Electric Field Strength (V/m)		Magnetic Field Strength (A/m)		Equivalent Far-Field Power Density (mW/cm ²)	
0.3 - 1.34	614	614	1.63	1.63	100	100
1.34 - 3.0	614	823.8/f	1.63	2.19/f	100	$180/f^2$
3.0 - 30	1842/f	823.8/f	4.89/f	2.19/f	$900/ f^2$	$180/f^2$
30 - 300	61.4	27.5	0.163	0.0729	1.0	0.2
300 - 1,500	3.54 √ f	1.59 √ f	$\sqrt{f}/106$	$\sqrt{f/238}$	f/300	f/1500
1,500 - 100,000	137	61.4	0.364	0.163	5.0	1.0



Higher levels are allowed for short periods of time, such that total exposure levels averaged over six or thirty minutes, for occupational or public settings, respectively, do not exceed the limits, and higher levels also are allowed for exposures to small areas, such that the spatially averaged levels do not exceed the limits. However, neither of these allowances is incorporated in the conservative calculation formulas in the FCC Office of Engineering and Technology Bulletin No. 65 (August 1997) for projecting field levels. Hammett & Edison has built those formulas into a proprietary program that calculates, at each location on an arbitrary rectangular grid, the total expected power density from any number of individual radio sources. The program allows for the description of buildings and uneven terrain, if required to obtain more accurate projections.



RFR.CALC[™] Calculation Methodology

Assessment by Calculation of Compliance with FCC Exposure Guidelines

The U.S. Congress required (1996 Telecom Act) the Federal Communications Commission ("FCC") to adopt a nationwide human exposure standard to ensure that its licensees do not, cumulatively, have a significant impact on the environment. The maximum permissible exposure limits adopted by the FCC (see Figure 1) apply for continuous exposures from all sources and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health. Higher levels are allowed for short periods of time, such that total exposure levels averaged over six or thirty minutes, for occupational or public settings, respectively, do not exceed the limits.

Near Field.

Prediction methods have been developed for the near field zone of panel (directional) and whip (omnidirectional) antennas, typical at wireless telecommunications base stations, as well as dish (aperture) antennas, typically used for microwave links. The antenna patterns are not fully formed in the near field at these antennas, and the FCC Office of Engineering and Technology Bulletin No. 65 (August 1997) gives suitable formulas for calculating power density within such zones.

For a panel or whip antenna, power density $S = \frac{180}{\theta_{BW}} \times \frac{0.1 \times P_{net}}{\pi \times D \times h}$, in mW/cm²,

and for an aperture antenna, maximum power density $S_{max} = \frac{0.1 \times 16 \times \eta \times P_{net}}{\pi \times h^2}$, in mW/cm²,

where θ_{BW} = half-power beamwidth of the antenna, in degrees, and

P_{net} = net power input to the antenna, in watts,

D = distance from antenna, in meters,

h = aperture height of the antenna, in meters, and

 η = aperture efficiency (unitless, typically 0.5-0.8).

The factor of 0.1 in the numerators converts to the desired units of power density.

Far Field.

OET-65 gives this formula for calculating power density in the far field of an individual RF source:

power density
$$S = \frac{2.56 \times 1.64 \times 100 \times RFF^2 \times ERP}{4 \times \pi \times D^2}$$
, in mW/cm²,

where ERP = total ERP (all polarizations), in kilowatts,

RFF = relative field factor at the direction to the actual point of calculation, and

D = distance from the center of radiation to the point of calculation, in meters.

The factor of 2.56 accounts for the increase in power density due to ground reflection, assuming a reflection coefficient of 1.6 ($1.6 \times 1.6 = 2.56$). The factor of 1.64 is the gain of a half-wave dipole relative to an isotropic radiator. The factor of 100 in the numerator converts to the desired units of power density. This formula has been built into a proprietary program that calculates, at each location on an arbitrary rectangular grid, the total expected power density from any number of individual radiation sources. The program also allows for the description of uneven terrain in the vicinity, to obtain more accurate projections.



Yergovich and Associates, LLC

1826 Webster Street • San Francisco, CA 94115 • (415) 596-3474 • myergo@gmail.com

March 6, 2014

City Planner
Planning Department
City of Oakland
250 Frank Ogawa Plaza, 2nd Floor
Oakland, CA 94612

Re: Proposed AT&T Mobility DAS Node Installation, Expedited Review Requested

Applicant: New Cingular Wireless PCS, LLC (d/b/a AT&T Mobility)

Site Address: Public Right-of-Way near 1265 Mountain Blvd.

Oakland Planning #: DR13-026

Site ID: OAKS-046B

Latitude/Longitude: 37.837516, -122.218729

Dear City Planner,

On behalf of New Cingular Wireless PCS, LLC, d/b/a AT&T Mobility ("AT&T"), this letter and attached materials are to apply for a conditional use permit to install a distributed antenna system ("DAS") node in the public right-of-way near 1265 Mountain Boulevard ("Node 46"). This is the same DAS node that AT&T pursued by its previous Application DR13-026. AT&T has withdrawn Application DR13-026 in order to provide this new application for a redesigned DAS node at the same site. Specifically, at the city's direction, AT&T is pursuing a redesign of Node 46 consistent with discussions between the city and AT&T. The following is an explanation of the existing site, a project description of the redesigned facility, the project purpose and justifications in support of this proposal.

A. Project Description.

The existing site consists of an approximate 24-feet tall wooden utility pole (Joint Utility Pole #110138449) in the public right-of-way on the west side of Mountain Boulevard near 1265 Mountain Boulevard north of Florence Terrace. Across the street is another utility pole approximately 36 feet, seven inches tall with a cobra-head light at about 28 feet high. There are numerous tall redwood and other trees in the area and the terrain slopes upward to the north/east.

AT&T originally proposed to modify the utility pole on the west side of Mountain Boulevard by swapping it for a pole that is 10 feet taller, adding two approximately two-feet long panel antennas mounted on top, and affixing two cabinets, a fiber unit, a meter and a shut-off switch to the pole.

After discussing AT&T's proposal with the Planning Department and meeting with a representative of the Planning Department on site we have revised our design consistent with our discussions to minimize any visual impact, especially from the viewpoint of residents looking west downhill across the street toward Highway 13. We are now proposing to swap Joint Utility Pole #110138449 (the "antenna pole") for one that is five feet taller, to provide the

¹ AT&T expressly reserves all rights concerning the city's jurisdiction to assert zoning regulation over the placement of wireless facilities in the public rights-of-way.

minimum separation (4 feet) between the antennas and the power line as required by California Public Utility Commission General Order 95 (GO 95). Instead of installing the equipment cabinets on the same pole, we have further revised our application at the city's request to propose a singular equipment box approximately 96 inches long by 24 inches wide and deep, on a joint utility pole across the street on the east side of Mountain Boulevard (the "equipment pole"). Miniature emergency shut-off safety switches will be placed on both poles at about eight feet above ground, and an electricity meter will be placed on the equipment pole at the same height. Climbing pegs will be added onto the antenna pole. The equipment will be connected to power and telecommunications lines already on the equipment pole, extended through one-inch and three-inch conduit. Conduit trenched across the street will connect proposed lines from AT&T's equipment to the antennas. All equipment will be painted brown to match the utility pole. Our proposal is depicted in the attached design drawings and photographic simulations.

This is an unmanned facility that will operate at all times (24 hours per day, 7 days per week) and will be serviced about once per month by an AT&T technician. Our proposal will greatly benefit the area by improving wireless telecommunications service as detailed below.

B. Project Purpose.

The purpose of this project is to provide AT&T third and fourth generation (3G and 4G) wireless voice and data coverage to the surrounding area where there is currently a significant gap in service coverage. These wireless services include mobile telephone, wireless broadband, emergency 911, data transfers, electronic mail, Internet, web browsing, wireless applications, wireless mapping and video streaming. The proposed node is part of a larger DAS providing coverage to areas of Oakland, Berkeley, Kensington and El Cerrito that are otherwise very difficult to cover using traditional macro wireless telecommunications facilities due to the local topography and mature vegetation. The radio frequency propagation maps submitted with Application DR13-026 depict AT&T's larger DAS project. Those propagation maps are attached here for reference. Further radio frequency details are set forth in the attached Radio Frequency Statement, including propagation maps depicting existing and proposed coverage in the vicinity of Node 46.

A DAS network consists of a series of radio access nodes connected to small telecommunications antennas, typically mounted on existing wooden utility poles within the public rights-of-way, to distribute wireless telecommunications signals. DAS networks provide telecommunications transmission infrastructure for use by wireless services providers. These facilities allow service providers such as AT&T to establish or expand their network coverage and capacity. The nodes are linked by fiber optic cable that carry the signal stemming from a central equipment hub to a node antenna. Although the signal propagated from a node antenna spans over a shorter range than a conventional tower system, DAS can be an effective tool to close service coverage gaps.

C. Project Justification, Design and Placement.

Node 46 is located in a difficult service coverage area because of its winding roads, hilly terrain and plentiful trees. The coverage area consists of a hilly Oakland Hills neighborhood just east of Highway 13, including Mountain Boulevard, Capricom Avenue and surrounding areas. Node 46 will cover transient traffic along the roadways and provide in-building service to the surrounding residences as depicted in the propagation maps, which are exhibits to the attached Radio Frequency Statement.

Node 46 is the least intrusive means to provide coverage to this area because it uses existing utility infrastructure, adding small equipment without disturbing the character of the neighborhoods served. Deploying a DAS node onto these existing poles minimizes any visual impact by utilizing an inconspicuous location. By installing antennas and equipment onto these existing poles, AT&T does not need to propose any new infrastructure in this coverage area. Node 46 should be barely noticeable amidst the backdrop of trees and terrain.

The DAS node RF emissions are also much lower than the typical macro site and appropriate for the area, and they are fully compliant with the FCC's requirements for limiting human exposure to radio frequency energy. The attached radio frequency engineering analysis provided by Hammett & Edison, Inc., Consulting Engineers, confirms that the proposed equipment will operate well within (and actually far below) all applicable FCC public exposure

limits. The facility will also comply with California Public Utility Commission (CPUC) General Orders 95 (concerning overhead line design, construction and maintenance) and 170 (CEQA review) that govern utility use in the public right-of-way.

This proposed redesign is a viable alternative design developed according to our discussions with the Planning Department in the context of Application DR13-026. As proposed, Node 46 is the least intrusive option because antennas can be installed without raising the pole height by very much and equipment can be installed on the non-view side of the street, nestled amidst a large Italian Cypress Tree as the city suggested. Also the proposed location is the best coverage option because it sits on a ridge, slightly higher in elevation than locations north or south along Mountain Boulevard.

AT&T considered alternative sites on other utility poles in this area but none of these sites is as desirable from a coverage perspective or from an aesthetics perspective. The proposed location is approximately equidistant from other DAS nodes that AT&T plans to place in surrounding hard-to-reach areas, so that service coverage can be evenly distributed. There are a number of trees near the proposed site that will allow the installation to blend in with the backdrop of foliage. The other utility poles in the area are more conspicuous than the proposed poles. In addition to the utility poles proposed to house Node 46, AT&T considered the following alternative sites in the area:

- Alternative 1 (37.83795, -122.218848) / 1238 Mountain Blvd.: This alternative consists of the utility pole just north of the proposed location. This site is not feasible from a radio frequency perspective because service coverage from this location would not close AT&T's service coverage gap in this area. Further, the pole is overloaded with a cobra-head light and a transformer such that the only way to install antennas would be to swap out the pole for one at least 10 feet taller. The visual impact imposed by the extended pole, antennas and equipment mounted thereto, would be much more impactful than proposed Node 46, especially from the residences just to the east of this pole.
- Alternative 2 (37.837332, -122.218386) / 1310 Mountain Blvd.: This alternative consists of the utility pole just south of the proposed location. As with Alternative 1, this pole is overloaded with a cobra-head light and a transformer such that the only way to install antennas would be to swap out the pole for one at least 10 feet taller. The visual impact imposed by the extended pole, antennas and equipment mounted thereto, would be much more impactful than proposed Node 46, especially from the residences just to the east of this pole. Also, service coverage from this location would not close AT&T's service coverage gap in this area to the extent as from proposed Node 46 because of the reduced elevation at this alternative site.
- Alternative 3 (37.837045, -122.218144) / 1334 Mountain Blvd.: This alternative consists of a utility pole further south of the proposed location. As with the alternative sites discussed above, this pole is overloaded with a cobrahead light, power and telephone lines connected to nearby houses that obstruct the climbing zone. In order to facilitate a DAS node here, the pole would need to be replaced with a new ten-feet taller pole and utility lines would need to be reoriented. The extra height would impose much more visual impact to the area than proposed Node 46, especially to the houses to the east of this pole. Also, service coverage from this location would not close AT&T's service coverage gap in this area to the extent as from proposed Node 46 because of the reduced elevation at this alternative site.
- Alternative 4 (37.838272, -122.219076) / 1220 Mountain Blvd.: This alternative consists of a utility pole further north of the proposed location. The existence of a cobra-head light, utility pole cross-arms, power and telephone lines occupying the climbing space renders this pole too crowded for installation of a DAS node facility. Even if these implementation issues were overcome, a ten-feet tall extension would be required to separate antennas from the utility lines and would impose much more visual impact than proposed Node 46, especially for the neighbors to the east of this pole.
- Alternative 5 (37.837479, -122.219465) / 271 Glenwood Glade: Poles further west near the intersection of Duncan Way and Glenwood Glade were evaluated, including this alternative. This site is not feasible from a radio frequency perspective. Service coverage from this location would not close AT&T's service coverage gap in this area because it is too far downhill to achieve adequate coverage. Likewise, other utility poles near this intersection

are inadequate to meet AT&T's service coverage objective. In addition, this pole is unavailable for installation because of its five crisscrossing arms and a cobra-head light that occupy the climbing zone.

- Alternative 6 (37.83794, -122.217796) / 271 Capricorn Ave.: This alternative is a utility pole just northeast of the proposed site, uphill on a parallel street to Mountain Boulevard. The pole is unavailable for installation because it is overloaded with a cobra-head light, power and utility lines that obstruct the climbing zone. Further, this pole is extremely exposed and a DAS node here would impede the view of neighbors across the street, which would impose much more visual impact than proposed Node 46.
- Alternative 7 (37.838176, -122.218049) / 255 Capricorn Ave.: This alternative is a utility pole just north of Alternative 6. It too is unavailable for installation of a DAS node because it is overloaded with a cobra-head light, a transformer, cross-arms, power and utility lines that obstruct the climbing zone. This pole too is very exposed and a DAS node would impede the view of neighbors across the street, which would impose much more visual impact than proposed Node 46.

Because of the terrain challenges mentioned above, no alternatives other than a DAS on existing utility poles were feasible within the service coverage objective. Any other locations would require new infrastructure imposing unnecessary visual impact and would not be able to provide coverage to the intended coverage area. For these reasons, Node 46 is the least intrusive means to close AT&T's significant service coverage gap in the area.

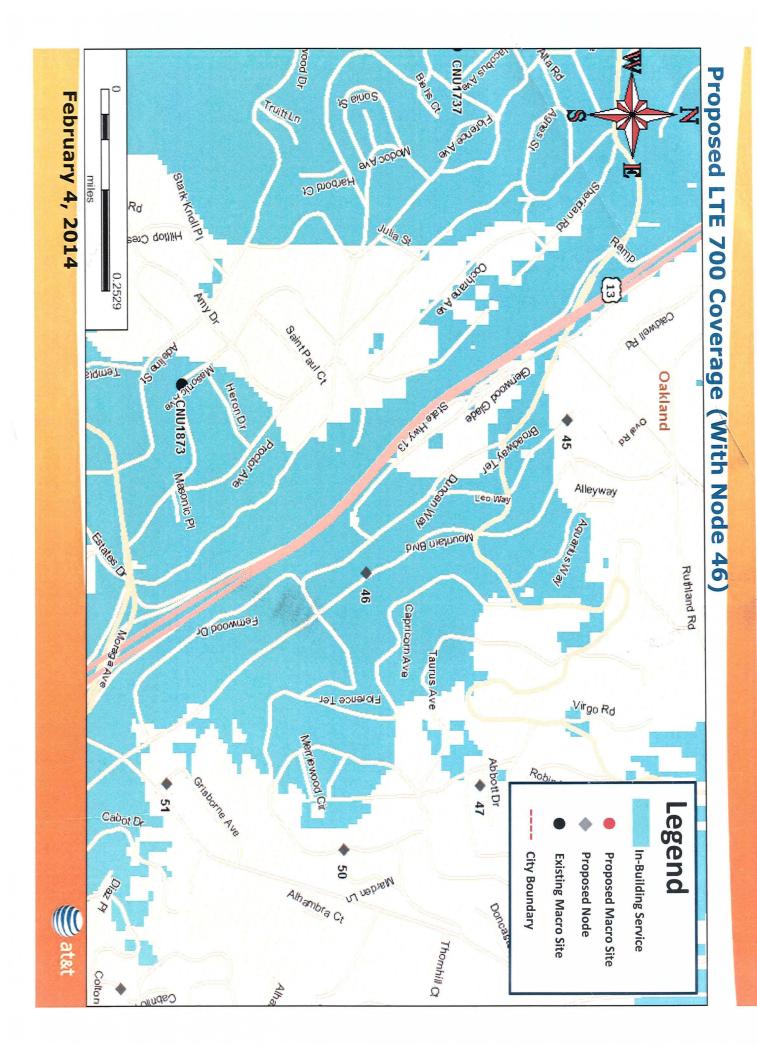
Revised drawings, an AT&T Radio Frequency Statement, propagation maps, photographic simulations, and a radio-frequency engineering analysis are included with this packet.

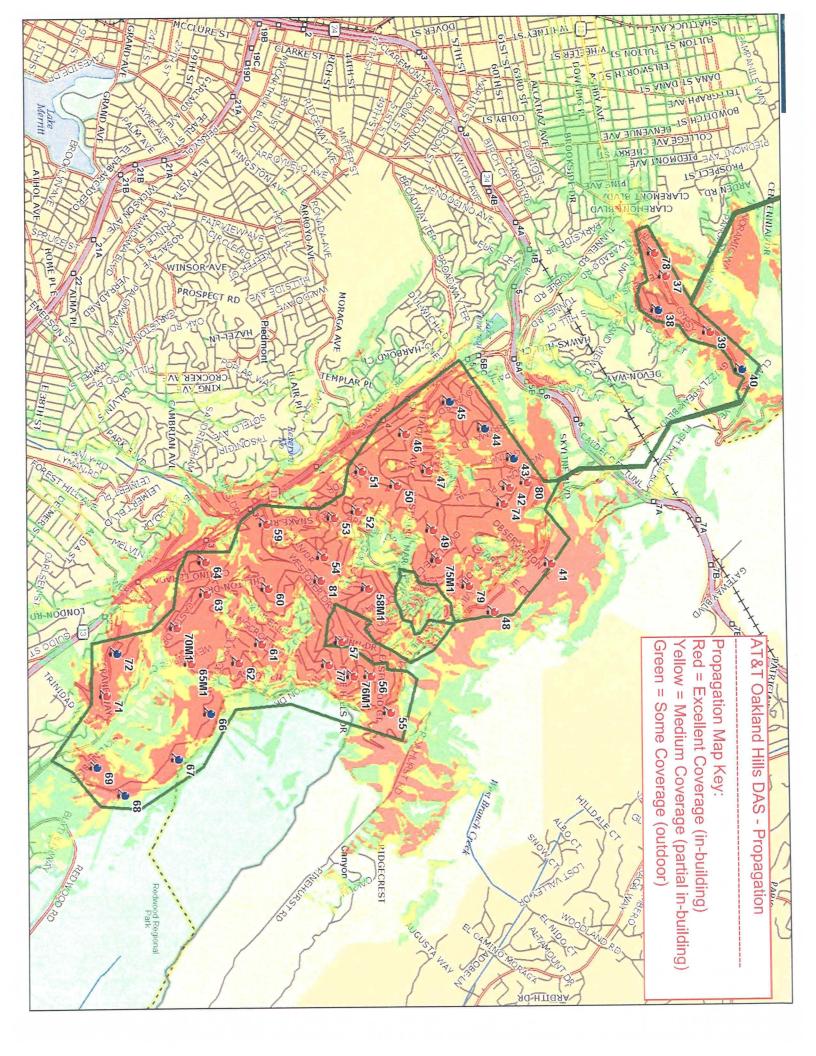
As this application seeks authority to install a wireless telecommunication facility, the FCC's Shot Clock Order² requires the city to issue its final decision on AT&T's application within 150 days. We respectfully request expedited review and approval of this application. Feel free to contact me if you have any questions. Thank you.

Best Regards,

Matthew S. Yergovich ExteNet Real Estate Contractor For AT&T Mobility

² See Petition for Declaratory Ruling to Clarify Provisions of Section 332(c)(7)(B), WT Docket No. 08-165, Declaratory Ruling, 24 F.C.C.R. 13994 (2009).





From:

Miller, Scott

Sent:

Monday, March 23, 2015 10:38 AM

To:

Gmail

Cc:

Tom Garten; Hackett, Maurice; Campbell Washington, Annie; Merkamp, Robert

Subject:

RE: Notice removed at 1301 Mountain Blvd., hearing item cancelled?

Thank you, Melyssa, for bringing this to our attention. We will notify AT&T representatives and have a replacement sign issued for them to put up. This lost or stolen sign does not invalidate the April 1st hearing, but its replacement is important as this sign notice augments the 300 foot mailed notice also provided.

Scott

Scott Miller, Zoning Manager | Bureau of Planning | 250 Frank H. Ogawa Plaza, Suite 2114 | Oakland, CA 94612 | Phone: (510) 238-2235 | Fax: (510) 238-4730 | Email: smiller@oaklandnet.com | Website: www.oaklandnet.com/planning

----Original Message----

From: Gmail [mailto:melyssa@gmail.com] Sent: Monday, March 23, 2015 10:28 AM

To: Hackett, Maurice; Merkamp, Robert; Miller, Scott; Campbell Washington, Annie

Cc: Tom Garten

Subject: Notice removed at 1301 Mountain Blvd., hearing item cancelled?

Good morning, Mo,

The PLN14036 notice at the utility pole at 1301 Mountain Blvd. for the proposed AT&T cell antennas/equipment has been removed. I'm unsure when this happened and who is responsible, but we noticed it on Saturday, 3/21 and it has not been replaced as of this morning (at least 3 days without posted notice). Does this mean the item has been removed from the 4/1 hearing agenda? If not, please replace the posted notice at this site because it's important for our community members to have proper notice.

Thanks,

Melyssa Minamoto

From:

Moises Aceves <maceves@ebiconsulting.com>

Sent:

Monday, March 23, 2015 12:56 PM Hackett, Maurice; Matt Yergovich

To: Cc:

Miller, Scott

Subject:

RE: OAKHILLS-ATT Node 46 / Notice removed at 1301 Mountain Blvd. / Need for

Reposting

Attachments:

IMG_0947.jpg; IMG_0949.jpg; IMG_0948.jpg

Moe,

Here is new photo evidence of Node 46 reposting. The material was reposted today at about 11:30 at ~1301 Mountain Blvd. As with last time, the materials were secured to the pole with daisy chained rubber bands and joined with paper clips - - Just as you suggested. I included additional color copies of the simulation photographs in case people were curious and wanted to take an additional sheet or two.

I also dropped off the requested additional full size drawings for Node 52L this morning (you helped me process the intake last week).

Thank you again,

Moises 415.894.0406

----Original Message----

From: Hackett, Maurice [mailto:MHackett@oaklandnet.com]

Sent: Monday, March 23, 2015 12:10 PM

To: Matt Yergovich; Moises Aceves; Hackett, Maurice

Cc: Miller, Scott

Subject: RE: OAKHILLS-ATT Node 46 / Notice removed at 1301 Mountain Blvd. / Need for Reposting

Hi Matt.

It looks like the sign was picked up by Moises.

Thanks Moises! Please send a photo once it is mounted at the site.

Moe

Moe Hackett, Planner II | City of Oakland | Bureau of Planning | 250 Frank H. Ogawa, Suite 2114 | Oakland, CA 94612 | Phone: (510) 238-3973 | Fax: (510) 238-4730 | Email: mhackett@oaklandnet.com | Website: www.oaklandnet.com/planning

----Original Message----

From: Matt Yergovich [mailto:myergovich@extenetsystems.com]

Sent: Monday, March 23, 2015 11:01 AM To: Moises Aceves; Hackett, Maurice

Subject: RE: OAKHILLS-ATT Node 46 / Notice removed at 1301 Mountain Blvd. / Need for Reposting

That works fine. Thanks Moises.

Be sure to take another photo. The last one came in handy since the sign was stolen.

Thanks again.

-Matt

From: Moises Aceves [maceves@ebiconsulting.com]

Sent: Monday, March 23, 2015 10:59 AM

To: Matt Yergovich; mhackett@oaklandnet.com

Subject: RE: OAKHILLS-ATT Node 46 / Notice removed at 1301 Mountain Blvd. / Need for Reposting

Yes, I can drop in pick that up and repost at like 1-1:30 today? If that works for you Moe. It is also an opportunity to drop off the second plans needed for 52L.

----Original Message----

From: Matt Yergovich [mailto:myergovich@extenetsystems.com]

Sent: Monday, March 23, 2015 10:54 AM

To: mhackett@oaklandnet.com; Moises Aceves

Subject: OAKHILLS-ATT Node 46 / Notice removed at 1301 Mountain Blvd. / Need for Reposting

Moe: Thank you for alerting us of the sign removal.

Moises: Do you have time today to swing by Oakland Planning, pick up a new sign and repost it on Mountain Boulevard?

Thank you.

-Matt

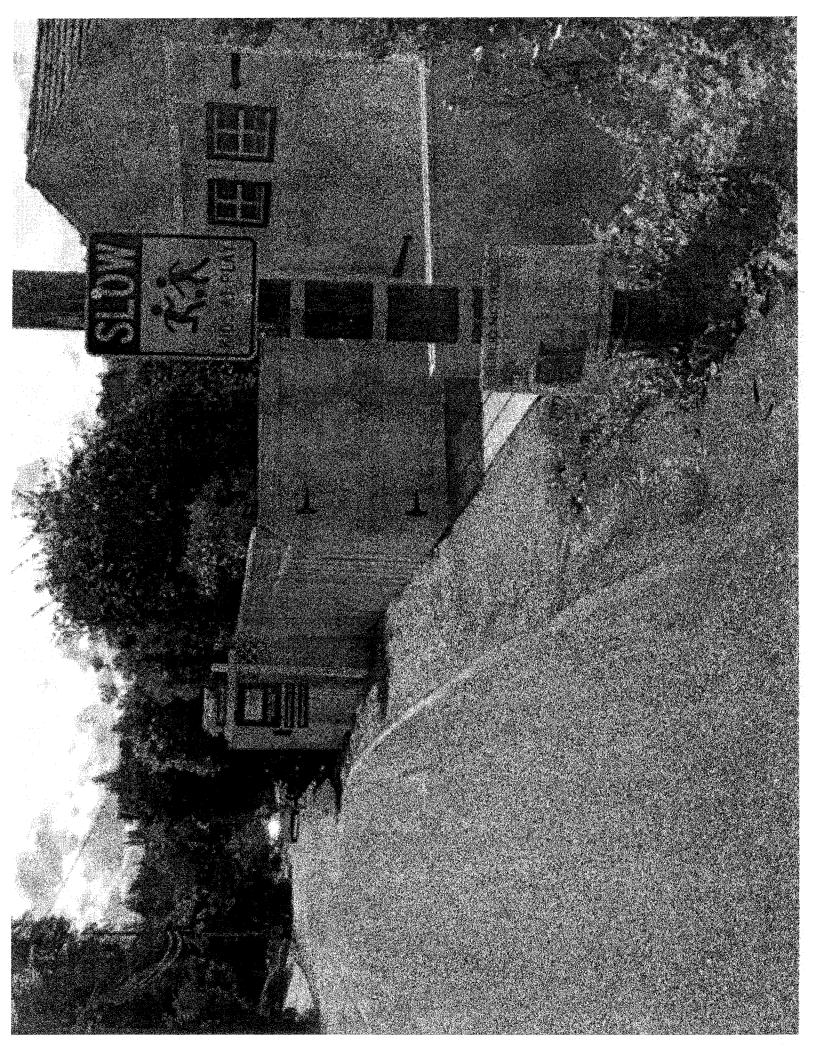
Matthew S. Yergovich External Relations Director Pacific Northwest Region ExteNet Systems, Inc. (415) 596-3474

From: Hackett, Maurice [MHackett@oaklandnet.com]

Sent: Monday, March 23, 2015 10:39 AM

To: Matt Yergovich

Subject: FW: Notice removed at 1301 Mountain Blvd., hearing item cancelled?



From: Melyssa Minamoto <melyssa@gmail.com>

Sent: Monday, March 23, 2015 10:06 PM

To: Thomas Garten

Cc: Griffin, Leroy; Pattillo, Chris; Moore, Jim; jahazielbonillaoaklandpc@gmail.com; Coleman,

Michael; jmyres.oakplanningcommision@gmail.com; nagrajplanning@gmail.com;

ew.oakland@gmail.com; myergovich@extenetsystems.com; Hackett, Maurice; Campbell

Washington, Annie; Merkamp, Robert; Miller, Scott

Subject: Re: Further Fire Safety Analysis Required Re: AT&T Planning Application PLN14036

Dear Assistant Fire Marshall Griffin,

After pulling the issue from the October 15, 2014 Planning Commission hearing, AT&T is again attempting to install cell antennas and associated equipment on the utility poles between 1244-1300 Mountain Blvd. and 1301-1265 Mountain Boulevard. The public hearing on AT&T's proposal will take place before the Oakland Planning Commission on 4/1/15.

You will see my original email to you below. As you recall, I also left you several voicemails through September and October seeking a response to residents' concerns and I was disappointed that you never replied to me. However, I did not assume that you did nothing to investigate this matter. In fact, I heard from former Councilmember Schaaf's office and from Robert Merkamp of the Planning Bureau that you would require a safety analysis for AT&T's proposal. Has this safety analysis happened? If so, can you please forward me the details and results? If not, when will it happen and who will be responsible for conducting it?

There is new information that I'd like to share with you relating to safety:

- 1. We learned from a long-time resident of this neighborhood that there was a fire on the east pole at issue (on which AT&T wants to install the 8x2x2 equipment box and PG&E energy meter), shortly before we moved here in 2011. The neighbor recalled that a transformer blew on the top of the pole causing a fire and a downed power line. Can you please provide us with the details of this fire? The affected residents at the time found it extremely difficult to identify the party responsible for the equipment fire on this pole and thus have that party fix it.
- 2. There was a meeting between residents, representatives from the Planning Bureau, representatives from AT&T, and an individual from former Councilmember Shaaf's office on 9/15/2014. Apart from the residents, none of these individuals were aware of the previous fire on the east pole mentioned above, which was discouraging. At this meeting, residents expressed concerns about the stability, weight and safety of the proposal. In particular, residents inquired about:

Specific timeline in our case on when such analyses were/will be performed, and by whom (For example, did AT&T do the safety analysis before it filed its application; does AT&T do the analysis after it files the application but before the Planning Commission hearing; Does PG&E do the analysis after the Planning Commission approval and before building; or does PG&E do the analysis after the site is completely built?). Also, who is ultimately responsible for the structural integrity -- i.e. the safety of these utility poles going forward?

No one provided a clear answer regarding whether a safety analysis has been performed, when it would be performed and by whom, or who is responsible for making sure these poles are safe. We received conflicting information on all of these issues. After the meeting, we asked AT&T to clarify these outstanding safety questions. Nearly 6 months later, we have received no response.

- 3. In November 2014, a Utilities Engineer from the California Public Utilities Commission responded to our safety inquiries with the following:
 - a. "The weight of new equipment is considered with the structural analysis done by the companies [AT&T and PG&E]. CPUC cannot disclose any structural calculations as they are confidential and proprietary between the companies." (It's alarming that residents living on all sides of the utility poles at issue are precluded from safety information because such information is the property of the corporations that put the residents' safety at risk for profit).
 - b. "AT&T and PG&E together did a structural analysis on the two poles factoring in the additional equipment. The initial design suggested a pole replacement is necessary..." (If this is the case, then the AT&T representatives tasked with fielding resident concerns at the 9/15 meeting didn't know about such an analysis and could not provide residents with any information on it).

- c. "CPUC does not require an environmental impact [fire safety, strong wind or seismic] analysis or State permit application for each telecommunication project. However, the local jurisdictions may initiate such analysis according to their own standards as needed." (In other words, the State cannot be relied upon to ensure the fire safety, strong wind or seismic stability of this project and it doesn't seem to hold AT&T or PG&E accountable for any safety showing. It seems that the State is passing this safety responsibility onto the City).
- 4. In the recent wind and rain storms experienced this month, a tree cracked in half and downed both a power line and utility pole one block away from our home, on the west side of Mountain Blvd. just on the other side of Florence Terrace. This is another example -- in addition to the tree that fell across our front entry in 2011 -- of how the safety of proposed AT&T equipment installed on the poles on our street is highly questionable. Additionally, in speaking with our neighbors we have discovered trees have fallen during storms on the properties of 218 Duncan (rear entrance located on Mountain Blvd.) and 1326 Mountain Blvd., separate incidents of downed power lines at 1245 Mountain Blvd. and 1238 Mountain Blvd. prior to 2011, and a utility pole-related fire at 218 Duncan. This section of Mountain Blvd. is clearly a wind tunnel as well as a traffic thoroughfare. The narrow road, blind turns and high driver speeds caused a recent collision in which a car ended up in the front patio of 1315 Mountain Blvd. Considering how this area of Mountain Blvd. experiences wind storms and high traffic, it's unwise for AT&T to increase the height of the west utility pole at issue by 8 ft. and add antennas and it's bulky electric equipment to the east utility pole at issue. It is equally unwise for the City to allow it.

Residents are upset that AT&T is moving this application forward before the Planning Commision on April 1st, considering AT&T's lack of knowledge and transparency on the safety issues. It has become clear that AT&T doesn't prioritize the residential safety and structural stability of its projects, and even seems to pass the safety buck to PG&E. Given the new information and all the concerns previously explained, I urge you to keep residential safety at the forefront of AT&T's application, as it appears the City is the only agency that can hold AT&T (and PG&E) accountable. Please make AT&T prove that its project is structurally sound in an earthquake and in a windstorm, given the additional weight burden it proposes to add to our poles, before the Planning Commission has a chance to approve this project. Please also respond to our questions (in italics above) before the April 1st hearing date.

Sincerely,

Melyssa Minamoto and Tom Garten

On Sat, Sep 6, 2014 at 1:35 AM, Thomas Garten < tomgarten@yahoo.com > wrote: Dear Assistant Fire Marshall Griffin,

On 9/27, we saw a Public Notice from the City of Oakland posted in front of our home at 1300 Mountain Blvd (see attached). The notice states that AT&T has applied to the City to install "new macro telecommunications facilities (2 antennas and associate equipment cabinets)" on one utility pole between 1244 and 1300 Mountain Blvd. and on another pole between 1301 and 1265 Mountain Blvd to improve cell service for AT&T customers. There is a public hearing on 9/17 before the Oakland Planning Commission that will determine whether AT&T's application will go forward.

We have been in contact with Mr. Maurice Hackett of the Planning Bureau (the Case Planner on our file, PLN14036) and Mr. Matt Yergovich, the Applicant on behalf of AT&T, to seek out more detailed information on this project. Thus far, we have received the following information:

- The utility poles at issue are jointly owned by several utilities; AT&T purchased a joint ownership interest in these poles to install the equipment.
- The antennas proposed for the west utility pole (between 1301 and 1265 Mountain Blvd.) are covered by a casing that is approximately 3 feet tall x 2 feet wide, making the total height of the pole approximately 32 feet an 8 foot increase.
- The equipment cabinet is approximately 8 feet tall x 2 feet wide x 2 feet deep, and contains at least a backup battery and a "quadband flexwave prism." The cabinet is connected by above-ground cables to the antenna on the utility pole across the street.

- · The cabinet will be located on the utility pole between 10 feet and 18 feet off the ground.
- · To power the equipment cabinet, PG&E will install a meter and energy supply on the same utility pole.

The information that Mr. Hackett and Mr. Yergovich could or would not provide, despite our repeated requests throughout this week, is as follows:

- The weight of the antennas, casing, anchors and associated cables on the west utility pole.
- · The weight of the cabinet and associated cables on the east utility pole.
- · Whether AT&T or the City has done a structural or stability analysis on each of the poles, factoring in the additional equipment.
- · Whether AT&T or the City has done a fire safety, strong wind, or seismic analysis for each of the poles, factoring in the additional equipment.
- · Whether the antennas and equipment attract lightning.

We have attached some photos to this letter showing the utility poles in question. The poles appear to be older and the wood appears dry and weak. The poles also appear to lean toward the south and the east pole already has a metal brace at the base. The poles already support quite a bit of equipment. For example, the east pole carries several heavy cable(s) and wires and a streetlight. In addition, the proximity of these poles to vegetation and homes raises fire danger concerns.

This area is prone to earthquakes and fires. I was born and raised in Oakland and I will never forget how the 1991 Firestorm caused many deaths and destroyed my friends' homes. In November of 2011, our area experienced high winds, causing a tree to fall across the front part of our house, barely missing the house itself, our vehicles, and power lines (see attached photos). We were thankful that it was only a tree. Elsewhere, there is evidence that the addition of telecommunications equipment on utility poles does indeed pose a danger, and may lead to fires. See http://www.electronicsilentspring.com/primers/cell-towers-cell-phones/cell-tower-fires-collapsing/. For example, AT&T and other telecommunications companies overburdened utility poles in Malibu, California, which led to a devastating fire in 2007 after heavy winds. See http://www.vcstar.com/news/no-oversight-of-power-poles-topped-with-heavy. In addition, telecommunications equipment may catch fire on its own or during repair. See http://www.nbcphiladelphia.com/news/local/Cell-Phone-Tower-on-Fire-in-Bucks-County-212489511.html.

Placing the proposed equipment in such close proximity to vegetation and homes, and overburdening older utility poles poses a risk to our safety.

We hope that you can perform or initiate a structural analysis of the utility poles, taking into account the proposed addition of AT&T's equipment. At a minimum, please tell us who is responsible for these considerations? It worries us that both our Case Planner and AT&T were unable to provide any information regarding the structural integrity of the utility poles. All of the utility companies buying into these poles share in the responsibility for ensuring that the poles are safe. This now includes AT&T. This also includes the City of Oakland, whose Planning Department oversees the safety of AT&T's application.

Please visit the proposed site and see it for yourselves.

Sincerely, Melyssa Minamoto and Tom Garten

Cc: CPUC Commissioner President Michael R. Peevey CPUC Commissioner Michael Peter Florio CPUC Commissioner Catherine J.K. Sandoval CPUC Commissioner Carla J. Peterman CPUC Commissioner Michael Picker Alameda County District 5 Supervisor Keith Carson Oakland City Council Member Libby Schaaf, District 4 All Oakland City Planning Commissioners Oakland City Planner II, Maurice Hackett Matt Yergovich, Applicant on behalf of AT&T

From:

Miller, Scott

Sent:

Tuesday, March 17, 2015 4:22 PM

To: Cc: CHAN, DAREN L Hackett, Maurice

Subject:

RE: AT&T Application, node 46, Mountain

Hi, Daren, thanks for checking in on this. After the site visit, I am okay with this going forward as proposed.

Scott

Scott Miller, Zoning Manager I Bureau of Planning I 250 Frank H. Ogawa Plaza, Suite 2114 I Oakland, CA

94612 | Phone: (510) 238-2235 | Fax: (510) 238-

4730 | Email: smiller@oaklandnet.com | Website: www.oaklandnet.com/planning

From: CHAN, DAREN L [mailto:dc016g@att.com]

Sent: Tuesday, March 17, 2015 4:11 PM

To: Miller, Scott **Cc:** Hackett, Maurice

Subject: AT&T Application, node 46, Mountain

Hey Scott,

Just thought I'd check in with you and see where you are with AT&T's DAS application node 46 on Mountain Blvd. You mentioned last week that you'd be taking a look at the site with Mo. As we discussed, if you find the site acceptable, then we'd like to proceed with having the application heard at the 4/1 PC hearing. If you are having reservations, then we'd like to continue the item so we can work with you and Mo on a possible solution.

I look forward to hearing from you.

Sincerely, Daren

Daren Chan Area Manager AT&T External Affairs – Alameda County

Work: 925-823-2243 Cell: 510-334-5839

OCTOBER 15, 2014 PLANNING COMMISSION CORRESPONDENCE

From:

Barbara Kassal <mail@changemail.org>

Sent:

Tuesday, September 30, 2014 2:23 PM

To:

Hackett, Maurice

Subject:

5 new petition signatures: Barbara Kassal, Rosanne Ratkiewich...

5 new people recently signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

There are now 120 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360

Dear Moe Hackett,

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

- 120. Barbara Kassal Oakland, California
- 119. Rosanne Ratkiewich oakland, California
- 118. Toshaleza Msemaji Oakland, California
- 117. Rita Osterloh Oakland, California
- 116. brette johnson oakland, California



From:

Dr. A. Gardner <mail@changemail.org>

Sent:

Friday, September 26, 2014 8:29 PM

To:

Hackett, Maurice

Subject:

5 new petition signatures: Dr. A. Gardner, barbara waugh...

5 new people recently signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

There are now 114 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360

Dear Moe Hackett,

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

- 115. Dr. A. Gardner Oakland, California
- 114. barbara waugh oakland, California
- 113. Lois Wood Oakland, California
- 112. Tenisha Smith oakland, California
- 111. Solomon Munguía Oakland, California



From:

kate tanaka <mail@changemail.org>

Sent:

Thursday, September 25, 2014 6:39 AM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

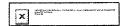
Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

kate tanaka Oakland, California

There are now 42 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

 $\frac{http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360$



548 Market St #29993, San Francisco, CA 94104-5401, USA

Contact us · Privacy policy



antennas/cabinets, several radii around the antennas/cabinets, e.g. 10 foot radius, 20 foot radius, 50 foot radius, 100 foot radius, 250 foot radius, 500 foot radius)?

- c. Do all such measurements of RF strength and power levels comply with FCC guidelines?
- 4. The notice states that the planning permits required are "Major Design Review and additional findings for Macro Telecommunications facilities within a residential zone." If such planning permits are granted to AT&T, what would happen in practical terms and what would the timeline be? In other words, would securing the planning permits at issue enable AT&T to have their plan reviewed and findings made by the City or do the permits enable AT&T to erect the antennas and "associate equipment cabinets" right away?
- 5. What requirements must AT&T meet to have the planning permits at issue granted by the City? In other words, what must AT&T prove to the City in order to get the necessary planning permits?
- a. We believe the applicable City regulations are Oakland Planning Code Chapters 17.128 Telecommunications Regulations, 17.134 Conditional Use Permit Procedure, and 17.13 RH Hillside Residential Zones Regulations. Is this correct? Are there other applicable City regulations for this file?
- b. Are there other applicable county, state, federal or other regulations for this file?

We understand we are asking for a lot of information, but this is very important to us, given the proximity of the proposed antennas and "associated equipment cabinets" to our home and the potential long-term effects on our neighborhood, neighbors and ourselves. We appreciate your prompt response as we need time to review the answers to our questions, ask follow-up questions and prepare for the September 17, 2014 hearing. Thank you.

Regards,

Melyssa Minamoto and Tom Garten

1300 Mountain Blvd.

Oakland, CA 94611

Cell: (510) 846-3558

Email: melyssa@gmail.com

From:

Hackett, Maurice

Sent:

Thursday, September 04, 2014 10:35 AM

To:

'Thomas Garten'; Melyssa Minamoto

Subject:

RE: Planning Commission Public Notice, Case File No. PLN14036

Hello Mr. Garten.

As I explained in a previous conversation with your wife this project only requires a Major Design Review (major being the review on the proposal by the Planning Commission). The language on the public notification letter was generated by a relatively new computer program that inadvertently included information from the initial project intake months ago when the project was taken in with a conditional use permit included in error. This was modified because the project does not require a conditional use permit since the site/ poles are within the public right of way, however the permit system still generated the notice based upon the initial incorrect application intake. The project does require Design Review (section 17.136) because it is located within a residential zone where any addition or alteration to facilities requires Design Review. The project must also meet the additional Macro Telecommunications findings (Section 17.128). I checked in with my supervisor and he assured me that the necessary information was included for notification purposes since the required permits were stated. We will clarify the incorrect additional information at the public hearing.

I apologize for the confusion. I will forward a copy of the Staff Report when it is released, which should be around September 12th.

Thank you for addressing your concerns to staff.

Moe

Moe Hackett, Planner II | City of Oakland | Bureau of Planning | 250 Frank H. Ogawa, Suite 2114 | Oakland, CA 94612 | Phone: (510) 238-3973 | Fax: (510) 238-4730 | Email: mhackett@oaklandnet.com | Website: www.oaklandnet.com/planning

From: Thomas Garten [mailto:tomgarten@yahoo.com]
Sent: Wednesday, September 03, 2014 2:51 PM

To: Hackett, Maurice; Melyssa Minamoto

Subject: Planning Commission Public Notice, Case File No. PLN14036

Mr. Hackett:

I'm writing to follow up on my voicemail from earlier today. First, thank you again for speaking with my wife, Melyssa, regarding AT&T's application. We are trying our best to come up to speed in the very short amount of time that we have been given, and we appreciate your assistance.

In order to prepare for the September 17th Hearing, we are trying to identify the exact City of Oakland Planning Code chapters that govern AT&T's application for PLN14036. The Public Notice, which is posted in front of the utility pole, states "Permits Required: Major Design Review and additional findings for *Macro Telecommunications facilities* within a residential zone." Based on my review of various Code chapters, it is my understanding that must meet the conditions set forth in the following sections:

1. Chapter 17.128 Telecommunications Regulations

- -- 17.128.070 governs criteria for "Macro Facilities," including those proposed to be located on existing poles.
 - -- 17.128.110 Site Location Preferences
 - -- 17.138.120 Site Design Preferences
 - -- 17.138.130 Radio frequency emissions standards

2. Chapter 17.134 Conditional Use Permit Procedure

- -- 17.134.040 Procedures for Consideration
- -- 17.134.050 General Use Permit Criteria

*I believe that the conditional use permit is necessary in this application because 17.128.070 Macro Facilities states that conditional permit criteria must be met.

3. Chapter 17.136 Design Review Procedure

- -- 17.136.040 states that "Proposals for new or modified Telecommunications Facilities" are subject to regular design review.
 - -- 17.136.050 provides regular design review criteria.

*To be candid, 17.136.050 Part B is the only provision that might potentially apply to telecommunications facilities, and even that is questionable.

Would you please confirm that this is the case? And if not, would you please explain why and identify the code sections that you believe are applicable here? It is imperative that we understand exactly what criteria will be applied so that we can be prepared to address those criteria at the upcoming hearing. We will also need a copy of AT&T's application, which my wife requested yesterday.

Finally, will you be preparing the staff report for PLN14036, which I understand will be available to the public at 3:00 pm on Friday, Sept. 12th?

Thanks again for your cooperation.

Best regards,

Tom Garten 1300 Mountain Boulevard Oakland, CA 94611

From:

Thomas Garten <tomgarten@yahoo.com>

Sent:

Thursday, September 04, 2014 12:34 PM

To:

Parker, Barbara; Smith, Jamie; Moreno, Doryanna; Lee, Heather; Hackett, Maurice;

Melvssa Minamoto

Subject:

Laws Applicable to AT&T Cell Tower Applications in the Oakland Hills

Dear City Attorney Members:

As you may already know, AT&T has filed dozens of applications in the Oakland Hills to install wireless telecommunications facilities in front of existing residences. This has raised many concerns for residents, and increasingly there have been efforts to combat the installation of the equipment by challenging the applications at the Planning Commission and by pursuing appeals to the City Council (at a cost of approximate \$1,400.00).

There is a key issue that I would like to bring to the attention of the Office of the Oakland City Attorney. In certain cases -- including the application for a telecommunications facility on a utility pole located in front of my house -- it appears that the Applicant, Bureau, and Commission have not been applying the Conditional Use Permit standards set forth in Chapter 17.134. I wrote to Mr. Hackett, the City Planner II tasked with AT&T's application in front of my home (copied on this email), to raise my concern. I have pasted that correspondence into this email below.

I would appreciate it if the Office of the City Attorney would weigh in on this issue. Residents are receiving very little notice with regard to these proposed towers (approximately 20 days), and the uncertainty regarding the applicable laws only serves to undermine the purpose of the public notice. Should you wish to do so, I am available to discuss by phone at 408-655-6329.

Best Regards,

Tom Garten 1300 Mountain Boulevard Oakland, CA 94611

EMAIL CORRESPONDENCE WITH MR. HACKETT:

On Thursday, September 4, 2014 12:04 PM, Thomas Garten < tomgarten@yahoo.com > wrote: Mr. Hackett:

Thanks for your email. I appreciate your confirmation that the Design Review (17.136) and Telecommunications Regulations (17.128) Chapters will apply in this action.

I am confused, however, by your statement that PLN14036 does not require a conditional use permit (CUP) since the site/poles are in the public right of way. I cannot find any regulation that provides an exemption from the CUP process where the equipment is to be installed on an existing pole. Can you provide a citation for me?

In fact, it seems that Chapter 17.128 -- which you have said applies to AT&T's application -- specifically requires a CUP in all cases where the proposed facility is to be located in or near a residential zone. For example, Chapter 17.128.025 states that "Any Telecommunications Facility shall not be permitted in, or within one hundred (100) feet of the boundary of, any residential zone . . . except upon the granting of a conditional use permit pursuant to the conditional use permit procedure in Chapter 17.134." The same language is included in Chapter 17.134.020 itself, which confirms that such telecommunications facilities must be subjected to the CUP process. Accordingly, even if the utility pole is in the public right of way, that limited public right of way is surrounded on all sides by a residential zone. I see no basis to circumvent the CUP process here.

I am concerned that the regulations are not being applied properly by the Bureau of Planning -- not just in this case, but in many of the various applications that have been filed by AT&T in the Oakland Hills over the past year. For that reason, I will be writing to the City Attorney's office to obtain input on this issue. I will copy you on that correspondence.

Finally, I'd like to note that the notification process has been a mess. As you correctly point out, there are errors in the notice. Not only is the description of the project inaccurate, but Matt Yergovich's phone number is incorrect, the owner of the utility pole appears to be misidentified, there is no information regarding the "Environmental Determination" associated with the project, and the City did not comply with its own law requiring notice to be mailed to all residents residing within 300 feet of the property involved not less than 17 days before the hearing. It is not enough to say that these things will be corrected at the hearing. Residents cannot be expected to submit all applicable evidence at the initial hearing -- which they must do because residents cannot raise new evidence on appeal -- when they are being informed for the first time at the hearing what the scope of the project is. I know that this is not a new concern; others have raised the deficient noticing process to the Commission and others, yet it appears that nothing has been done. It's very frustrating.

Best regards,

Tom Garten

On Thursday, September 4, 2014 10:34 AM, "Hackett, Maurice" <MHackett@oaklandnet.com> wrote:

Hello Mr. Garten.

As I explained in a previous conversation with your wife this project only requires a Major Design Review (major being the review on the proposal by the Planning Commission). The language on the public notification letter was generated by a relatively new computer program that inadvertently included information from the initial project intake months ago when the project was taken in with a conditional use permit included in error. This was modified because the project does not require a conditional use permit since the site/ poles are within the public right of way, however the permit system still generated the notice based upon the initial incorrect application intake. The project does require Design Review (section 17.136) because it is located within a residential zone where any addition or alteration to facilities requires Design Review. The project must also meet the additional Macro Telecommunications findings (Section 17.128). I checked in with my supervisor and he assured me that the necessary information was included for notification purposes since the required permits were stated. We will clarify the incorrect additional information at the public hearing. I apologize for the confusion. I will forward a copy of the Staff Report when it is released, which should be around September 12th.

Thank you for addressing your concerns to staff. Moe

Moe Hackett, Planner II | City of Oakland | Bureau of Planning | 250 Frank H. Ogawa, Suite 2114 | Oakland, CA 94612 | Phone: (510) 238-3973 | Fax: (510) 238-4730 | Email: mhackett@oaklandnet.com | Website: www.oaklandnet.com/planning

From: Thomas Garten [mailto:tomgarten@yahoo.com]
Sent: Wednesday, September 03, 2014 2:51 PM

To: Hackett, Maurice; Melyssa Minamoto

Subject: Planning Commission Public Notice, Case File No. PLN14036

Mr. Hackett:

I'm writing to follow up on my voicemail from earlier today. First, thank you again for speaking with my wife, Melyssa, regarding AT&T's application. We are trying our best to come up to speed in the very short amount of time that we have been given, and we appreciate your assistance.

In order to prepare for the September 17th Hearing, we are trying to identify the exact City of Oakland Planning Code chapters that govern AT&T's application for PLN14036. The Public Notice, which is posted in front of the utility pole, states "Permits Required: Major Design Review and additional findings for *Macro Telecommunications facilities* within a residential zone." Based on my review of various Code chapters, it is my understanding that must meet the conditions set forth in the following sections:

1. Chapter 17.128 Telecommunications Regulations

- -- 17.128.070 governs criteria for "Macro Facilities," including those proposed to be located on existing poles.
- -- 17.128.110 Site Location Preferences
- -- 17.138.120 Site Design Preferences

-- 17.138.130 Radio frequency emissions standards

2. Chapter 17.134 Conditional Use Permit Procedure

- -- 17.134.040 Procedures for Consideration
- -- 17.134.050 General Use Permit Criteria

*I believe that the conditional use permit is necessary in this application because 17.128.070 Macro Facilities states that conditional permit criteria must be met.

3. Chapter 17.136 Design Review Procedure

-- 17.136.040 states that "Proposals for new or modified Telecommunications Facilities" are subject to regular design review.

-- 17.136.050 provides regular design review criteria.

*To be candid, 17.136.050 Part B is the only provision that might potentially apply to telecommunications facilities, and even that is questionable.

Would you please confirm that this is the case? And if not, would you please explain why and identify the code sections that you believe are applicable here? It is imperative that we understand exactly what criteria will be applied so that we can be prepared to address those criteria at the upcoming hearing. We will also need a copy of AT&T's application, which my wife requested yesterday.

Finally, will you be preparing the staff report for PLN14036, which I understand will be available to the public at 3:00 pm on Friday, Sept. 12th?

Thanks again for your cooperation.

Best regards, Tom Garten 1300 Mountain Boulevard Oakland, CA 94611

From:

Thomas Garten <tomgarten@yahoo.com>

Sent:

Thursday, September 04, 2014 12:50 PM

To:

myergo@gmail.com; Hackett, Maurice; Melyssa Minamoto

Subject:

PLN14036 - Request for Information

Mr. Yergovich:

I'm a resident at 1300 Mountain Boulevard, Oakland, CA, which is adjacent to the proposed macro telecommunications facilities associated with PLN14036. As you know, the public hearing is set for Wednesday, September 17th.

Since my wife and I first learned about AT&T's application one week ago, we have been trying to educate ourselves about AT&T's proposal and the process by which these applications are evaluated and reviewed. Mr. Hackett has been kind enough to answer some of our questions.

I'm hoping that you can provide us with some information that you no doubt have at your fingertips. Most importantly, we would like a copy of AT&T's application materials for PLN14036. We can't reasonably be expected to prepare for the upcoming hearing without that information. Would you please send me a PDF today?

In addition, I would like to request that you provide me with a map that shows (1) the existing AT&T telecommunication facilities and associated equipment in the Oakland Hills, and (2) the proposed additional AT&T telecommunication facilities and associated equipment in the Oakland Hills.

Thank you,
Tom

From:

Melyssa Minamoto <melyssa@gmail.com>

Sent:

Sunday, August 31, 2014 3:39 PM

To:

Hackett, Maurice; Schaaf, Libby

Cc:

melyssa minamoto; Thomas Garten

Subject:

Resident Questions re Planning Commission Public Notice, Case File No. PLN14036

Mr. Moe Hackett

Planner II

City of Oakland Bureau of Planning

mhackett@oaklandnet.com

Ms. Libby Schaaf

Oakland City Councilmember, District 4

Ischaaf@oaklandnet.com

Dear Mr. Hackett and Ms. Schaaf,

This week we received a City of Oakland public notice regarding File No. PLN14036 ("Public right-of-way adjacent to: 1244, 1265, & 1300 Mountain Boulevard") adjacent to our property (within a foot of our mailbox). Respectfully, the notice lacks specificity, uses vague and confusing language, and seems to be missing important information when read in conjunction with the photo on the notice. We hope that you are able to cure some of these defects by answering the following questions:

- 1. The notice states the proposal is "To install a new macro telecommunications facilities (2 antennas and associated equipment cabinets) on two existing utility poles." The photos accompanying the notice show what appears to be one antenna extending on top of the utility pole on the east side of Mountain Blvd. and one "associated equipment cabinet" mounted on the middle of the utility pole on the west side of the street.
- a. Where is the other antenna depicted in the photo? Also, where are the other "associated equipment cabinets" depicted in the photo?
- b. What are the dimensions of the proposed antenna on the east side of the street and how far does it extend above the utility pole? What would be the total height of the utility pole with the proposed antenna?

- c. What exactly is an "associated equipment cabinet"? What is inside the proposed cabinet at issue and how do those components function?
 - d. What are the dimensions of the proposed "associated equipment cabinet"?
 - e. Where exactly on the west utility pole will the proposed "associated equipment cabinet" be placed?
- f. Can you point us to another Oakland Hills location where the same equipment has already been installed so we can see it?
- 2. Can you please provide us with a complete copy of AT&T's application for the planning permits required (including, but not limited to supporting materials, maps, studies, technical specifications, and communications regarding this application)?
- 3. Due to the Oakland Hills topography and positioning of homes on our street at different heights, can you please provide us with measurements of the electromagnetic radio-frequency (RF) field strength for the following:
- a. All vertical levels around the two proposed antennas and each of the "associate equipment cabinets" (including, but not limited to ground level, antennas/cabinets levels, and levels above antennas/cabinets?
- b. All horizontal distances from the two proposed antennas and each of the "associated equipment cabinets" (including, but not limited to the immediate radius of the antennas/cabinets, several radii around the antennas/cabinets, e.g. 10 foot radius, 20 foot radius, 50 foot radius, 100 foot radius, 250 foot radius, 500 foot radius)?
 - c. Do all such measurements of RF strength and power levels comply with FCC guidelines?
- 4. The notice states that the planning permits required are "Major Design Review and additional findings for Macro Telecommunications facilities within a residential zone." If such planning permits are granted to AT&T, what would happen in practical terms and what would the timeline be? In other words, would securing the planning permits at issue enable AT&T to have their plan reviewed and findings made by the City or do the permits enable AT&T to erect the antennas and "associate equipment cabinets" right away?
- 5. What requirements must AT&T meet to have the planning permits at issue granted by the City? In other words, what must AT&T prove to the City in order to get the necessary planning permits?
- a. We believe the applicable City regulations are Oakland Planning Code Chapters 17.128 Telecommunications Regulations, 17.134 Conditional Use Permit Procedure, and 17.13 RH Hillside Residential Zones Regulations. Is this correct? Are there other applicable City regulations for this file?
 - b. Are there other applicable county, state, federal or other regulations for this file?

We understand we are asking for a lot of information, but this is very important to us, given the proximity of the proposed antennas and "associated equipment cabinets" to our home and the potential long-term effects on our neighborhood, neighbors and ourselves. We appreciate your prompt response as we need time to review the answers to our questions, ask follow-up questions and prepare for the September 17, 2014 hearing. Thank you.

Regards,

Melyssa Minamoto and Tom Garten

1300 Mountain Blvd.

Oakland, CA 94611

Cell: (510) 846-3558

Email: melyssa@gmail.com

From:

Adrienne Selke <mail@changemail.org>

Sent:

Sunday, September 07, 2014 10:37 PM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Adrienne Selke Oakland, California

There are now 2 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA

Contact us · Privacy policy



From:

Matt Yergovich <myergovich@extenetsystems.com>

Sent:

Thursday, September 11, 2014 4:40 PM

To:

Thomas Garten; Melyssa Minamoto

Subject:

Proposed On-Site Meeting on 9/15 at 6pm, 1265 Mountain Blvd., Oakland Re AT&T

Planning Application PLN14036 / Node 46

Melyssa & Thomas,

We the applicants for the proposed AT&T wireless facility at 1265 Mountain Boulevard propose to meet with you and any other interested residents on site at 6pm this Monday, September 15th to answer your questions.

Please let us know if you are available. Thank you.

-Matt

Matthew S. Yergovich ExteNet Systems, Inc. (415) 596-3474

Thomas Garten <tomgarten@yahoo.com> From:

Saturday, September 06, 2014 1:36 AM Sent:

To: Griffin, Leroy

Pattillo, Chris; Moore, Jim; jahazielbonillaoaklandpc@gmail.com; Coleman, Michael; Cc:

imyres.oakplanningcommision@gmail.com; nagrajplanning@gmail.com;

ew.oakland@gmail.com; Schaaf, Libby; myergovich@extenetsystems.com; Hackett,

Maurice; dist5@acgov.org; mp1@cpuc.ca.gov; mike.florio@cpuc.ca.gov;

catherine.sandoval@cpuc.ca.gov; carla.peterman@cpuc.ca.gov;

michael.picker@cpuc.ca.gov, Ruhland, Lisa; Melyssa Minamoto

Further Fire Safety Analysis Required Re: AT&T Planning Application PLN14036 Subject:

Photos for PLN14036_reduced.pdf; Public notice and site photos_reduced.pdf Attachments:

Dear Assistant Fire Marshall Griffin,

On 9/27, we saw a Public Notice from the City of Oakland posted in front of our home at 1300 Mountain Blvd (see attached). The notice states that AT&T has applied to the City to install "new macro telecommunications facilities (2 antennas and associate equipment cabinets)" on one utility pole between 1244 and 1300 Mountain Blvd. and on another pole between 1301 and 1265 Mountain Blvd to improve cell service for AT&T customers. There is a public hearing on 9/17 before the Oakland Planning Commission that will determine whether AT&T's application will go forward.

We have been in contact with Mr. Maurice Hackett of the Planning Bureau (the Case Planner on our file, PLN14036) and Mr. Matt Yergovich, the Applicant on behalf of AT&T, to seek out more detailed information on this project. Thus far, we have received the following information:

- · The utility poles at issue are jointly owned by several utilities; AT&T purchased a joint ownership interest in these poles to install the equipment.
- · The antennas proposed for the west utility pole (between 1301 and 1265 Mountain Blvd.) are covered by a casing that is approximately 3 feet tall x 2 feet wide, making the total height of the pole approximately 32 feet - an 8 foot increase.
- · The equipment cabinet is approximately 8 feet tall x 2 feet wide x 2 feet deep, and contains at least a backup battery and a "quadband flexwave prism." The cabinet is connected by above-ground cables to the antenna on the utility pole across the street.
- · The cabinet will be located on the utility pole between 10 feet and 18 feet off the ground.
- · To power the equipment cabinet, PG&E will install a meter and energy supply on the same utility pole.

The information that Mr. Hackett and Mr. Yergovich could or would not provide, despite our repeated requests throughout this week, is as follows:

> · The weight of the antennas, casing, anchors and associated cables on the west utility pole.

- The weight of the cabinet and associated cables on the east utility pole.
- · Whether AT&T or the City has done a structural or stability analysis on each of the poles, factoring in the additional equipment.
- · Whether AT&T or the City has done a fire safety, strong wind, or seismic analysis for each of the poles, factoring in the additional equipment.
- · Whether the antennas and equipment attract lightning.

We have attached some photos to this letter showing the utility poles in question. The poles appear to be older and the wood appears dry and weak. The poles also appear to lean toward the south and the east pole already has a metal brace at the base. The poles already support quite a bit of equipment. For example, the east pole carries several heavy cable(s) and wires and a streetlight. In addition, the proximity of these poles to vegetation and homes raises fire danger concerns.

This area is prone to earthquakes and fires. I was born and raised in Oakland and I will never forget how the 1991 Firestorm caused many deaths and destroyed my friends' homes. In November of 2011, our area experienced high winds, causing a tree to fall across the front part of our house, barely missing the house itself, our vehicles, and power lines (see attached photos). We were thankful that it was only a tree. Elsewhere, there is evidence that the addition of telecommunications equipment on utility poles does indeed pose a danger, and may lead to fires. See http://www.electronicsilentspring.com/primers/cell-towers-cell-phones/cell-tower-fires-collapsing/. For example, AT&T and other telecommunications companies overburdened utility poles in Malibu, California, which led to a devastating fire in 2007 after heavy winds. See http://www.vcstar.com/news/no-oversight-of-power-poles-topped-with-heavy. In addition, telecommunications equipment may catch fire on its own or during repair. See http://www.nbcphiladelphia.com/news/local/Cell-Phone-Tower-on-Fire-in-Bucks-County-212489511.html.

Placing the proposed equipment in such close proximity to vegetation and homes, and overburdening older utility poles poses a risk to our safety.

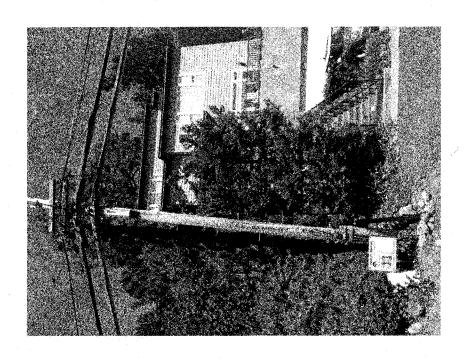
We hope that you can perform or initiate a structural analysis of the utility poles, taking into account the proposed addition of AT&T's equipment. At a minimum, please tell us who is responsible for these considerations? It worries us that both our Case Planner and AT&T were unable to provide any information regarding the structural integrity of the utility poles. All of the utility companies buying into these poles share in the responsibility for ensuring that the poles are safe. This now includes AT&T. This also includes the City of Oakland, whose Planning Department oversees the safety of AT&T's application.

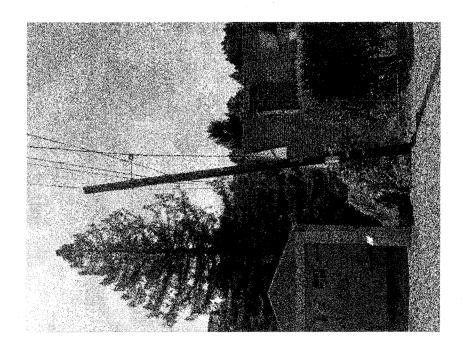
Please visit the proposed site and see it for yourselves.

Sincerely, Melyssa Minamoto and Tom Garten

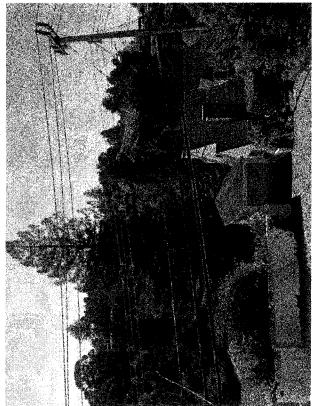
Cc: CPUC Commissioner President Michael R. Peevey CPUC Commissioner Michel Peter Florio CPUC Commissioner Catherine J.K. Sandoval CPUC Commissioner Carla J. Peterman CPUC Commissioner Michael Picker Alameda County District 5 Supervisor Keith Carson Oakland City Council Member Libby Schaaf, District 4 All Oakland City Planning Commissioners

Oakland City Planner II, Maurice Hackett Matt Yergovich, Applicant on behalf of AT&T

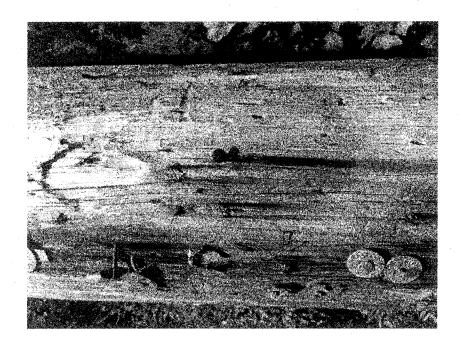














CITY OF OAKLAND

BUREAU OF PLANNING

250 Frank H. Ogawa Plaza, Suite 2114, Oakland, CA 94612-2031 Phone: 510-238-3911 Fax: 510-238-4730

PLANNING COMMISSION PUBLIC NOTICE

Location: Public right-of-way adjacent to: 1244, 1265, & 1300 Mountain Boulevard

Assessor's Parcel Number: Adjacent to: (APN's: 048G-7418-023-01, 048G-7418-018-00, 048G-7418-

061-00)

Proposal: To install a new macro telecommunications facilities (2 antennas and associated

equipment cabinets) on two existing utility poles.

Applicant / Matt Yergovich (for: AT&T)

Phone Number: (415) 596-3747

Owner: GG&E joint Utility Pole in the Public right-of-way: City of Oakland

Case File Number: PLN14036

Planning Permits Required: Major Design Review and additional findings for Macro Telecommunications

facilities within a residential zone

General Plan: Hillside Residential

Zoning: RH-4 Hillside Residential Zone

Environmental Determination: To be determined

Historic Status: Non-historic property

Service Delivery District: 2 City Council District: 4

Date Filed: March 6, 2014

Action to be Taken: Decision based on staff report

Finality of Decision: Appealable to City Council within 10 days

For Further Information: Contact case planner Moe Hackett; Planner II

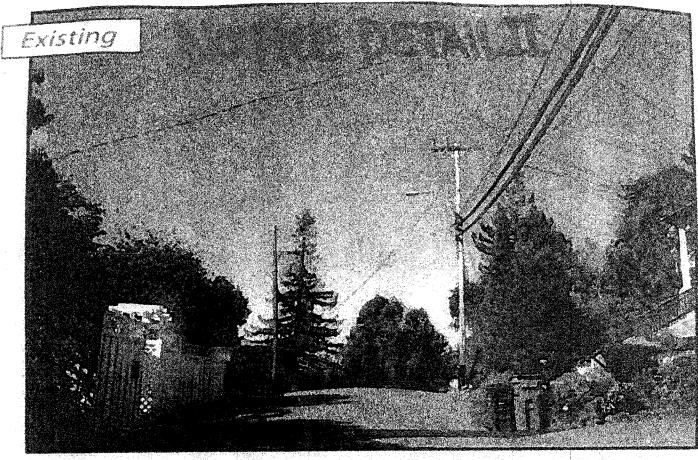
at (510) 238-3973 or mhackett@oaklandnet.com

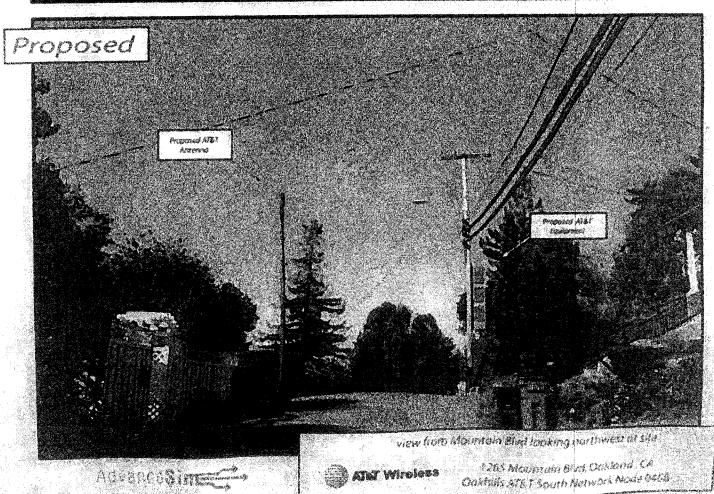
Your comments and questions, if any, should be directed to the Bureau of Planning, 250 Frank H. Ogawa Plaza, 2nd Floor, Oakland, California 94612-2031 at or prior to the public hearing to be held on Wednesday, September 17, 2014, at Oakland City Hall, Sgt. Mark Dunakin Hearing Room One, 1 Frank H. Ogawa Plaza, Oakland, California 94612. The public hearing will start at 6:00 p.m.

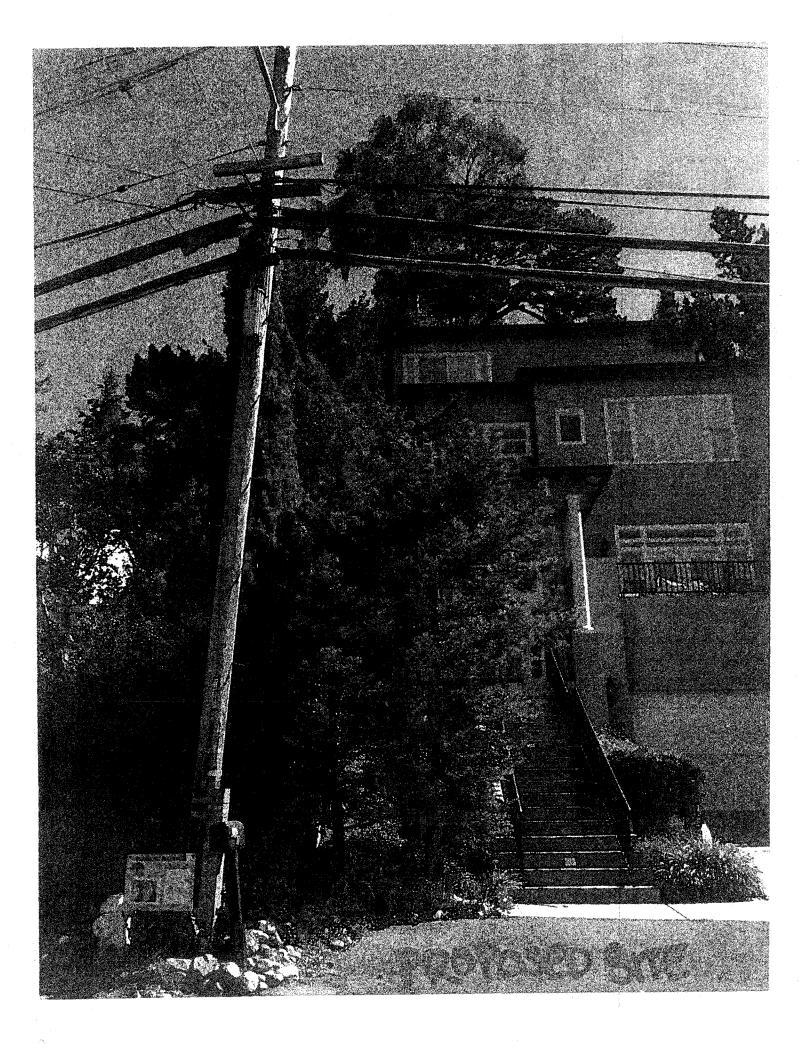
If you challenge the Planning Commission decision on appeal and/or in court, you will be limited to issues raised at the public hearing or in correspondence delivered to the Bureau of Planning, at, or prior to, the public hearing on this case. If you wish to be notified of the decision on this case, please indicate the case number and submit a self-addressed stamped envelope for each to the Bureau of Planning, 250 Frank H. Ogawa Plaza, 2nd Ploot, Onkland, California 94612-2031.

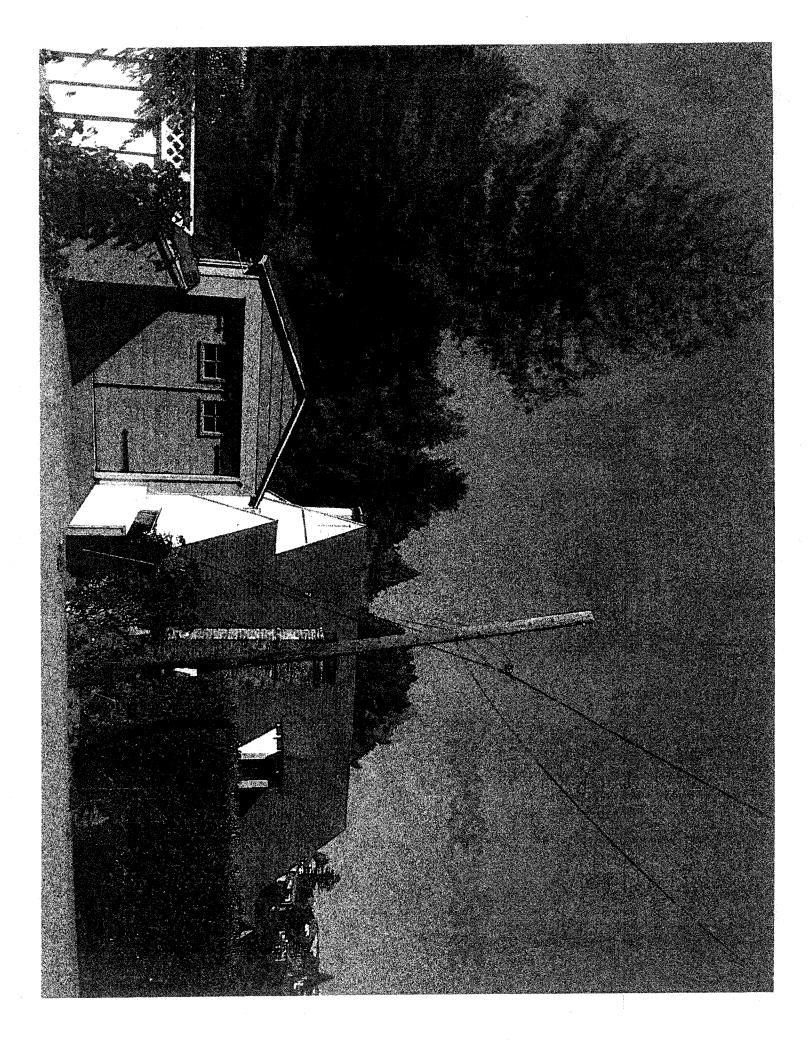
Please note that the description of the application found above is prelitininary in nature and that the project and/or such description may change prior to a decision being made. Except where noted, once a decision is reached by the Planning Commission on these cases, they are appealable to the City Council. Such appeals must be filled within ten (10) calendar days of the date of decision by the Planning Commission and by 4:00p.m. An appeal shall be on a form provided by the Bureau of Planning, and submitted by the Planning Commission and by 4:00p.m. An appeal shall be on a form provided by the Bureau of Planning, and submitted to the same at 250 Frank H. Ogawa Plaza, Suite 2114, to the attention of the Case Planner. The appeal shall state specifically wherein it is claimed there was error or abuse of discretion by the City of Oakland or wherein the decision is not supported by substantial evidence and must include payment in accordance with the City of Oakland Master Fee Schedule. Failure to like a timely appeal will preclude you from challenging the City's decision in court. The appeal itself must raise every issue that is contested along with all the arguments and evidence previously entered into the record prior to or at the public hearing mentioned above. Failure to do so will preclude you from raising such issues during the appeal hearing and/or in court.

POSTING DATE: August 29, 2014









From:

Hackett, Maurice

Sent:

Friday, September 12, 2014 11:15 AM

To:

'Gmail'

Cc:

Tom Garten

Subject:

RE: File No. PLN14036: Request for map showing property lines

Attachments:

grade map surveys (Mountian Bl).pdf

Good afternoon Melyssa,

I did a little research in the city building division this morning.

It appears that the public right of way (ROW) of mountain bl. In front of the four homes near the utility poles is 60 feet wide. Although the street paving is not necessarily centered I was able to determine that both poles appear to be within the public right of way (approximately 2' to 4' on the west and approximately 27' to 30' on the east side.). By lining the existing fire hydrant up with the edge of curb and the pattern of front property lines I was able to determine that the ROW extends more than 20' up your drive. The utility pole in front of 1265 /1301 lined up with the edge of paving was sited as far back as 1948.

The planning bureau does not maintain survey records. If you wish to research further I recommend you contact the building bureau. Ask for a records technician at 510-238-3891, however, I am satisfied that the pole are within the public right of way.

Also, it seems like a meeting on Monday evening is looking more and more likely. I intend to attend, and will bring the case file and research.

Moe

Moe Hackett, Planner II | City of Oakland | Bureau of Planning | 250 Frank H. Ogawa, Suite 2114 | Oakland, CA 94612 | Phone: (510) 238-3973 | Fax: (510) 238-4730 | Email: mhackett@oaklandnet.com | Website: www.oaklandnet.com/planning

----Original Message----

From: Gmail [mailto:melyssa@gmail.com]
Sent: Thursday, September 11, 2014 9:17 AM

To: Hackett, Maurice Cc: Tom Garten

Subject: File No. PLN14036: Request for map showing property lines

Good Morning Moe,

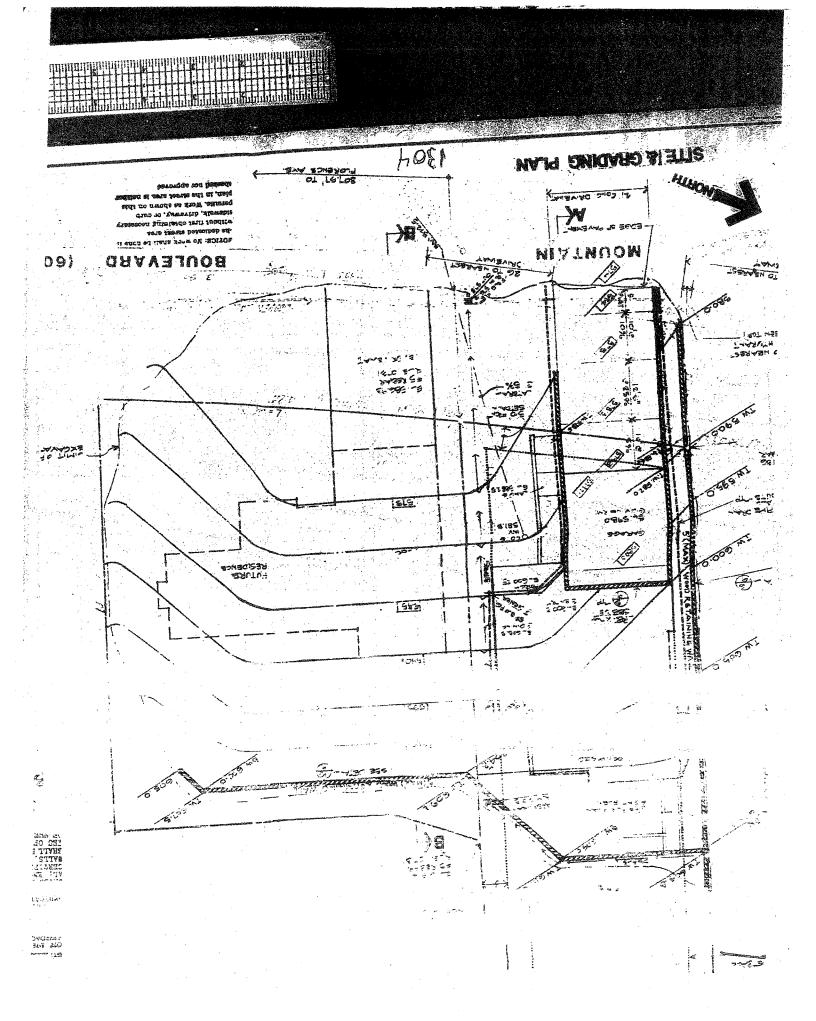
Do you at the Planning Bureau or the City of Oakland have a map of our section of Mountain Blvd, showing the property lines and public right of way lines for the four homes around the utility poles at issue? I'd like to see some official documentation that definitively shows the poles are/are not on private property.

Thanks for your time.

Sincerely,

Melyssa Minamoto

5707			
			2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
	62 80 79 18 18 18 18 18 18 18 18 18 18 18 18 18		POOD, GARLANG
	* (**)	MOUNTAIN	
			SURVEY NO. 32. LOCATION: LOT 36. SCALE BINGUE LT.



From:

Hackett, Maurice

Sent:

Friday, September 12, 2014 11:17 AM

To:

'Thomas Garten'; Matt Yergovich; Melyssa Minamoto

Subject:

RE: Resident Questions re Planning Commission Public Notice, Case File No. PLN14036 /

Node 46

- 1. The notice states the proposal is "To install a new macro telecommunications facilities (2 antennas and associated equipment cabinets) on two existing utility poles." The photos accompanying the notice show what appears to be one antenna extending on top of the utility pole on the east side of Mountain Blvd. and one "associated equipment cabinet" mounted on the middle of the utility pole on the west side of the street.
- a. Where is the other antenna depicted in the photo? Also, where are the other "associated equipment cabinets" depicted in the photo?

The two antennas are located side by side as a vertical extension of the existing pole on the west side of the street.

b. What are the dimensions of the proposed antenna on the east side of the street and how far does it extend above the utility pole? What would be the total height of the utility pole with the proposed antenna?

Two katherin panel antennas at 10 5/8" X 2' 2 3/4". Top of pole is 29' and the top of antenna is 31'

c. What exactly is an "associated equipment cabinet"? What is inside the proposed cabinet at issue and how do those components function?

This equipment includes mounting brackets, cables, cable guards, battery backups, power meters, switches, screening shroud, etc.

d. What are the dimensions of the proposed "associated equipment cabinet"?

2" X2" X8"

e. Where exactly on the west utility pole will the proposed "associated equipment cabinet" be placed?

The equipment cabinet is located on the east pole (hill side of the street) 10' 10" above the ground

f. Can you point us to another Oakland Hills location where the same equipment has already been installed so we can see it?

See attached list.

2. Can you please provide us with a complete copy of AT&T's application for the planning permits required (including, but not limited to supporting materials, maps, studies, technical specifications, and communications regarding this application)?

Plans, photo simulations and radio frequency report sent via e-mail (per my phone conversation with Melyssa Minamoto) additional information in the application includes a cover letter and the basic application form (attached in this e-mail)

3. Due to the Oakland Hills topography and positioning of homes on our street at different heights, can you please provide us with measurements of the electromagnetic radio-frequency (RF) field strength for the following:

This information request has been to the applicant. However, these are generally considered to be building permit issues and not zoning issues.

- a. All vertical levels around the two proposed antennas and each of the "associate equipment cabinets" (including, but not limited to ground level, antennas/cabinets levels, and levels above antennas/cabinets?
- b. All horizontal distances from the two proposed antennas and each of the "associated equipment cabinets" (including, but not limited to the immediate radius of the antennas/cabinets, several radii around the antennas/cabinets, e.g. 10 foot radius, 20 foot radius, 50 foot radius, 100 foot radius, 250 foot radius, 500 foot radius)?
 - c. Do all such measurements of RF strength and power levels comply with FCC guidelines?
- 4. The notice states that the planning permits required are "Major Design Review and additional findings for Macro Telecommunications facilities within a residential zone." If such planning permits are granted to AT&T, what would happen in practical terms and what would the timeline be? In other words, would securing the planning permits at issue enable AT&T to have their plan reviewed and findings made by the City or do the permits enable AT&T to erect the antennas and "associate equipment cabinets" right away?

in practical terms, if the Design Review were approved by the PC, the applicant would have two years to file their Building Permits and begin construction. You might wish to raise this question with AT&T as we don't have a construction schedule.

5. What requirements must AT&T meet to have the planning permits at issue granted by the City? In other words, what must AT&T prove to the City in order to get the necessary planning permits?

Major Design Review, additional macro Telecommunications Findings, and (in this case) Categorical California Environmental Quality Act Exemption (Sec. 15301 & 15303).

a. We believe the applicable City regulations are Oakland Planning Code Chapters 17.128 Telecommunications Regulations, 17.134 Conditional Use Permit Procedure, and 17.13 RH Hillside Residential Zones Regulations. Is this correct? Are there other applicable City regulations for this file?

The requirement of a Major CUP is for antennas located on private property. These antennas are located on the Right Of Way (ROW). Initially it was argued that therefore they were not subject to Planning approval (as most things in the ROW, including utilities, are not) however a court case several years ago granted cities the right to perform Design Review on such structures and that is why this application is here today.

b. Are there other applicable county, state, federal or other regulations for this file?

Environmental Declaration (Calif. Fish and Game Code Sec. 711.4), and Notice of Exemption (to the county of Alameda)

Moe Hackett, Planner II | City of Oakland | Bureau of Planning | 250 Frank H. Ogawa, Suite 2114 | Oakland, CA 94612 | Phone: (510) 238-3973 | Fax: (510) 238-4730 | Email: mhackett@oaklandnet.com | Website: www.oaklandnet.com/planning

From: Thomas Garten [mailto:tomgarten@yahoo.com]

Sent: Friday, September 05, 2014 12:51 PM

To: Hackett, Maurice; Matt Yergovich; Melyssa Minamoto

Subject: Re: Resident Ouestions re Planning Commission Public Notice, Case File No. PLN14036 / Node 46

Thanks, Moe. We received three documents from you:

1. AT&T Construction Documents for Node 046B (7 pages)

2. Photo of existing utility poles and proposed change (1 page)

3. Hammett & Edison Report for 32 Proposed DAS Nodes (5 pages)

I'm just wondering if there are any other application materials relevant to PLN14036? If there are, and they are simply too big for you to mail, perhaps Matt can send them to us. We just don't want to get to the hearing and discover that there is additional information that AT&T is relying upon for this project. For example, if there was an analysis regarding the stability of the utility poles in view of the proposed additional equipment, we'd like to know that. The same is true for an analysis of alternatives, including co-locating the equipment on an existing cell tower or locating the equipment in an area that is further removed from a residential zone. If it is just the 3 documents, that's fine. We'd just like to have all of the documents that have been submitted that are pertinent to this project.

Thanks for your responses.

Tom Garten and Melyssa Minamoto

On Friday, September 5, 2014 12:19 PM, "Hackett, Maurice" <MHackett@oaklandnet.com> wrote:

Hello all

I have sent and resent pdfs of the application material.

As I mentioned before to both of you, I have limited capacity to send large documents on my computer.

Melyssa, please respond if you received 3 e-mails each with an attachment.

I am responding this late in the day due to a zoning counter shift commitment earlier this morning.

Thanks

Please stay in touch.

Moe

а

Moe Hackett, Planner II | City of Oakland | Bureau of Planning | 250 Frank H. Ogawa, Suite 2114 | Oakland, CA 94612 | Phone: (510) 238-3973 | Fax: (510) 238-4730 | Email: mhackett@oaklandnet.com | Website: www.oaklandnet.com/planning

From: Matt Yergovich [mailto:myergovich@extenetsystems.com]

Sent: Friday, September 05, 2014 10:52 AM **To:** Melyssa Minamoto; Hackett, Maurice

Cc: Thomas Garten

Subject: RE: Resident Questions re Planning Commission Public Notice, Case File No. PLN14036 / Node 46

Melyssa,

My understanding is that the Planner Maurice Hackett has provided you with a copy of our application containing all applicable planning specifications for our proposal answering your questions below.

Regarding your engineering questions, the proposed equipment complies with all applicable state engineering standards as required by California Public Utilities Commission General Order 95 ("G.O. 95"). Our conditions of approval require the facility to be removed if the pole is undergrounded but there are no plans to underground this pole.

I'm happy to discuss any further questions with you this afternoon if you wish.

Thank you.

-Matt

Matthew S. Yergovich ExteNet Systems, Inc.

(415) 596-3474

From: Melyssa Minamoto [melyssa@gmail.com]
Sent: Friday, September 05, 2014 10:30 AM
To: mhackett@oaklandnet.com; Matt Yergovich

Cc: Thomas Garten

Subject: Re: Resident Questions re Planning Commission Public Notice, Case File No. PLN14036

Hi Moe and Mr. Yergovich,

A week has passed since my initial request for information. There are several points in my initial questions, the answers to which Moe told me on 9/2 to seek from Mr. Yergovich. Since then, I have sent 2 emails re-requesting this information and I have received no response. This process is incredibly frustrating. How am I expected to be fully informed about the telecommunications you want to put up in front of my home by the 9/17 hearing date?

Originally, because Moe told me on 9/2 that he would forward my request to Mr. Yergovich and that Mr. Yergovich was better informed to answer my questions, I directed my questions to Mr. Yergovich via Moe. But in the interests of time, I now ask either or both of you, again, to answer the following:

- 1. The notice states the proposal is "To install a new macro telecommunications facilities (2 antennas and associated equipment cabinets) on two existing utility poles." The photos accompanying the notice show what appears to be one antenna extending on top of the utility pole on the east side of Mountain Blvd. and one "associated equipment cabinet" mounted on the middle of the utility pole on the west side of the street.
- a. The drawing seem to indicate that the cabinet will contain a "battery backup" and "quadband flexwave prism," while a meter will sit below the shroud. Are there other components as well? What is a flexwave prism?
- b. Can you point us to another Oakland Hills location where the same equipment has already been installed so we can see it?
- 2. Can you please provide us with a complete copy of AT&T's application for the planning permits required (including, but not limited to supporting materials, maps, studies, technical specifications, and communications regarding this application)? [Yesterday, my husband Tom received a photo, an RF report for several different sites in general, and a mock-up of the equipment. However, we would like to review AT&T's application, an RF report for our specific proposed site with emissions readings at all levels of exposure, a demonstration that AT&T faces a gap in coverage, and analyses of alternative locations and designs considered].
- 3. Due to the Oakland Hills topography and positioning of homes on our street at different heights, can you please provide us with measurements of the electromagnetic radio-frequency (RF) field strength for the following:
- a. All vertical levels around the two proposed antennas and each of the "associate equipment cabinets" (including, but not limited to ground level, antennas/cabinets levels, and levels above antennas/cabinets?

- b. All horizontal distances from the two proposed antennas and each of the "associated equipment cabinets" (including, but not limited to the immediate radius of the antennas/cabinets, several radii around the antennas/cabinets, e.g. 10 foot radius, 20 foot radius, 50 foot radius, 20 foot radius, 50 foot radius, 20 foot radius)?
 - c. Do all such measurements of RF strength and power levels comply with FCC guidelines?
- A. What is the weight of the the antenna on the west utility pole? What is the weight of the associated equipment box on the east utility pole?
- B. Has AT&T done a structural or stability analysis on each of these utility poles?
- C. Has AT&T done a fire safety, strong wind, or seismic analysis for the antennas and equipment box on the poles?
- D. Will the antennas attract lightning?
- E. If the utilities go underground, what will AT&T then do with the antenna and the associated equipment box?

These questions are particularly important regarding the safety of our home and our neighborhood from damage caused by the proposed equipment due to fire, collapse, accidents, wind, earthquakes and lightning. It worries me that Moe did not have the equipment weight information when we spoke on 9/2, as the weight of the equipment in light of the structural integrity of the utility poles is a major design consideration. Adding heavy, large cables, antennas and an 8x2x2 equipment box with an energy meter onto old, wooden, leaning utility poles without calculating the collapse risk shows callous disregard for my safety, my home, our neighborhood and the Oakland Hills (which already burned up in the 1991 Firestorm). I am particularly concerned that, considering Moe telling me on 9/2 that these are joint utility poles in which AT&T purchased a joint ownership, no one is keeping track of the weight and wind-load dangers on them. Under the principal of joint and several liability, all the utilities on these poles share in the responsibility for all aspects of their safety. This now includes AT&T as a joint owner. This also includes the City of Oakland, whose Planning Department and Commissioners oversee the safety of the design application from AT&T.

As I have stated repeatedly, the hearing on this matter is on 9/17. The more time that passes that you are not providing this information to me, the less time I have to inform myself, my neighbors and prepare for the hearing. Please send me this information by the end of day today so that (while I was hoping to have this week to review it after work), I at least have the weekend before the work week begins.

Thank you,

Melyssa Minamoto

On Thu, Sep 4, 2014 at 11:55 AM, Gmail < melyssa@gmail.com > wrote: Hi Moe,

I saw that you forwarded my request following our conversation for AT&T's application and materials to Matt Yergovich yesterday. I'm hoping to receive them today because there's not much time for us to review and digest them before your staff report is released and before the hearing. If I don't hear from Matt by this afternoon, can you please email all the requested materials? I know you mentioned that sending them to me might crash your computer, but it's been a few days since I sent my initial request and time is of the essence.

Also, were you able to forward my email (below) to Matt? I haven't received a response from him yet. I directed these questions to him because it seemed from our conversation on Tuesday that you didn't have specific answers or information, but it would really help if you are able to find out these answers in light of how little time we have left before the staff report and hearing.

Thanks,

Melyssa

On Sep 3, 2014, at 1:37 AM, Melyssa Minamoto <melyssa@gmail.com> wrote:

Hi Moe,

Could you also have Matt email me with the answers to questions 1(c), 1(f), 2, and 3 of my original email? Can Matt include any location and design alternative analysis that AT&T conducted for our proposed sites?

Additional questions I have for Matt, based on our conversation today, are as follows:

A. What is the weight of the the antenna on the west utility pole? What is the weight of

the associated equipment box on the east utility pole?

B. Has AT&T done a structural or stability analysis on each of these utility poles?

C. Has AT&T done a fire safety, strong wind, or seismic analysis for the antennas and equipment box on the poles?

D. Will the antennas attract lightening?

E. If the utilities go underground, what will AT&T then do with the antenna and the associated equipment box?

I appreciate you passing this on.

Thanks,

Melyssa

On Tue, Sep 2, 2014 at 6:23 PM, Gmail < melyssa@gmail.com > wrote: Hi Moe,

Thanks for calling me today. Can you please have Matt Yergovich from AT&T email me a PDF of their application and all materials in support of their application?

Thanks,

Melyssa

On Aug 31, 2014, at 3:38 PM, Melyssa Minamoto < melyssa@gmail.com > wrote:

Mr. Moe Hackett
Planner II
City of Oakland Bureau of Planning
mhackett@oaklandnet.com

Ms. Libby Schaaf
Oakland City Councilmember, District 4
Ischaaf@oaklandnet.com

Dear Mr. Hackett and Ms. Schaaf,

This week we received a City of Oakland public notice regarding File No. PLN14036 ("Public right-of-way adjacent to: 1244, 1265, & 1300 Mountain Boulevard") adjacent to

our property (within a foot of our mailbox). Respectfully, the notice lacks specificity, uses vague and confusing language, and seems to be missing important information when read in conjunction with the photo on the notice. We hope that you are able to cure some of these defects by answering the following questions:

- 1. The notice states the proposal is "To install a new macro telecommunications facilities (2 antennas and associated equipment cabinets) on two existing utility poles." The photos accompanying the notice show what appears to be one antenna extending on top of the utility pole on the east side of Mountain Blvd. and one "associated equipment cabinet" mounted on the middle of the utility pole on the west side of the street.
- a. Where is the other antenna depicted in the photo? Also, where are the other "associated equipment cabinets" depicted in the photo?
- b. What are the dimensions of the proposed antenna on the east side of the street and how far does it extend above the utility pole? What would be the total height of the utility pole with the proposed antenna?
- c. What exactly is an "associated equipment cabinet"? What is inside the proposed cabinet at issue and how do those components function?
 - d. What are the dimensions of the proposed "associated equipment cabinet"?
- e. Where exactly on the west utility pole will the proposed "associated equipment cabinet" be placed?
- f. Can you point us to another Oakland Hills location where the same equipment has already been installed so we can see it?
- 2. Can you please provide us with a complete copy of AT&T's application for the planning permits required (including, but not limited to supporting materials, maps, studies, technical specifications, and communications regarding this application)?
- 3. Due to the Oakland Hills topography and positioning of homes on our street at different heights, can you please provide us with measurements of the electromagnetic radio-frequency (RF) field strength for the following:
- a. All vertical levels around the two proposed antennas and each of the "associate equipment cabinets" (including, but not limited to ground level, antennas/cabinets levels, and levels above antennas/cabinets?
- b. All horizontal distances from the two proposed antennas and each of the "associated equipment cabinets" (including, but not limited to the immediate radius of the antennas/cabinets, several radii around the antennas/cabinets, e.g. 10 foot radius, 20 foot radius, 50 foot radius, 100 foot radius, 250 foot radius, 500 foot radius)?
- c. Do all such measurements of RF strength and power levels comply with FCC guidelines?
- 4. The notice states that the planning permits required are "Major Design Review and additional findings for Macro Telecommunications facilities within a residential zone." If such planning permits are granted to AT&T, what would happen in practical terms and what would the timeline be? In other words, would securing the planning permits at issue enable AT&T to have their plan reviewed and findings made by the City or do the permits enable AT&T to erect the antennas and "associate equipment cabinets" right away?
- 5. What requirements must AT&T meet to have the planning permits at issue granted by the City? In other words, what must AT&T prove to the City in order to get the necessary planning permits?
- a. We believe the applicable City regulations are Oakland Planning Code Chapters 17.128 Telecommunications Regulations, 17.134 Conditional Use Permit Procedure, and 17.13 RH Hillside Residential Zones Regulations. Is this correct? Are there other applicable City regulations for this file?
- b. Are there other applicable county, state, federal or other regulations for this file?

We understand we are asking for a lot of information, but this is very important to us, given the proximity of the proposed antennas and "associated equipment cabinets" to our home and the potential long-term effects on our neighborhood, neighbors and ourselves. We appreciate your prompt response as we need time to review the answers

to our questions, ask follow-up questions and prepare for the September 17, 2014 hearing. Thank you.

Regards,

Melyssa Minamoto and Tom Garten 1300 Mountain Blvd. Oakland, CA 94611 Cell: (510) 846-3558 Email: melyssa@gmail.com

From:

Thomas Garten <tomgarten@yahoo.com>

Sent:

Thursday, September 04, 2014 4:47 PM

To:

Gmail: Hackett. Maurice

Subject:

Re: Fwd: Resident Questions re Planning Commission Public Notice, Case File No.

PLN14036

Mr. Hackett: Is this AT&T's application? It appears to be just a photo, an RF report, and a mock-up of the equipment. Were there not additional materials, including an application and analysis of alternatives?

On Thursday, September 4, 2014 4:40 PM, Gmail <melyssa@gmail.com> wrote:

Begin forwarded message:

From: "Hackett, Maurice" < MHackett@oaklandnet.com>

Date: September 4, 2014 at 4:17:29 PM PDT

To: "Gmail" < melyssa@gmail.com >

Subject: RE: Resident Questions re Planning Commission Public Notice, Case

File No. PLN14036

Hi Melyssa and Thomas,

Sorry about the delay. I have been working on other cases for the bulk of the day.

The applicant prefers that I send the documentation.

Hope this is helpful.

Moe Hackett, Planner II | City of Oakland | Bureau of Planning | 250 Frank H. Ogawa, Suite 2114 | Oakland, CA 94612 | Phone: (510) 238-3973 | Fax: (510) 238-4730 | Email: mhackett@oaklandnet.com | Website: www.oaklandnet.com/planning

From: Gmail [mailto:melyssa@gmail.com]
Sent: Thursday, September 04, 2014 11:55 AM

To: Hackett, Maurice Cc: Thomas Garten

Subject: Re: Resident Questions re Planning Commission Public Notice, Case File No. PLN14036

Hi Moe,

I saw that you forwarded my request following our conversation for AT&T's application and materials to Matt Yergovich yesterday. I'm hoping to receive them today because there's not much time for us to review and digest them before your staff report is released and before the hearing. If I don't hear from Matt by this afternoon, can you please email all the requested materials? I know you mentioned that sending them to me might crash your computer, but it's been a few days since I sent my initial request and time is of the essence.

Also, were you able to forward my email (below) to Matt? I haven't received a response from him yet. I directed these questions to him because it seemed from our conversation on Tuesday that you didn't have specific answers or information, but it would really help if you are able to find out these answers in light of how little time we have left before the staff report and hearing.

Thanks,

Melyssa

On Sep 3, 2014, at 1:37 AM, Melyssa Minamoto <melyssa@gmail.com> wrote:

Hi Moe,

Could you also have Matt email me with the answers to questions 1(c), 1(f), 2, and 3 of my original email? Can Matt include any location and design alternative analysis that AT&T conducted for our proposed sites?

Additional questions I have for Matt, based on our conversation today, are as follows: A. What is the weight of the antenna on the west utility pole? What is the weight of the associated equipment box on the east utility pole?

- B. Has AT&T done a structural or stability analysis on each of these utility poles?
- C. Has AT&T done a fire safety, strong wind, or seismic analysis for the antennas and equipment box on the poles?
- D. Will the antennas attract lightening?
- E. If the utilities go underground, what will AT&T then do with the antenna and the associated equipment box?

I appreciate you passing this on.

Thanks,

Melyssa

On Tue, Sep 2, 2014 at 6:23 PM, Gmail < melyssa@gmail.com > wrote: Hi Moe,

Thanks for calling me today. Can you please have Matt Yergovich from AT&T email me a PDF of their application and all materials in support of their application?

Thanks.

Melyssa

On Aug 31, 2014, at 3:38 PM, Melyssa Minamoto < melyssa@gmail.com > wrote:

Mr. Moe Hackett
Planner II
City of Oakland Bureau of Planning
mhackett@oaklandnet.com

Ms. Libby Schaaf
Oakland City Councilmember, District 4
Ischaaf@oaklandnet.com

Dear Mr. Hackett and Ms. Schaaf,

This week we received a City of Oakland public notice regarding File No. PLN14036 ("Public right-of-way adjacent to: 1244, 1265, & 1300 Mountain Boulevard") adjacent to our property (within a foot of our mailbox). Respectfully, the notice lacks specificity, uses vague and confusing language, and seems to be missing important information when read in conjunction with the photo on the notice. We hope that you are able to cure some of these defects by answering the following questions:

- 1. The notice states the proposal is "To install a new macro telecommunications facilities (2 antennas and associated equipment cabinets) on two existing utility poles." The photos accompanying the notice show what appears to be one antenna extending on top of the utility pole on the east side of Mountain Blvd. and one "associated equipment cabinet" mounted on the middle of the utility pole on the west side of the street.
- a. Where is the other antenna depicted in the photo? Also, where are the other "associated equipment cabinets" depicted in the photo?
- b. What are the dimensions of the proposed antenna on the east side of the street and how far does it extend above the utility pole? What would be the total height of the utility pole with the proposed antenna?
- c. What exactly is an "associated equipment cabinet"? What is inside the proposed cabinet at issue and how do those components function?
 - d. What are the dimensions of the proposed "associated equipment cabinet"?
- e. Where exactly on the west utility pole will the proposed "associated equipment cabinet" be placed?
- f. Can you point us to another Oakland Hills location where the same equipment has already been installed so we can see it?
- 2. Can you please provide us with a complete copy of AT&T's application for the planning permits required (including, but not limited to supporting materials, maps, studies, technical specifications, and communications regarding this application)?
- 3. Due to the Oakland Hills topography and positioning of homes on our street at different heights, can you please provide us with measurements of the electromagnetic radio-frequency (RF) field strength for the following:
- a. All vertical levels around the two proposed antennas and each of the "associate equipment cabinets" (including, but not limited to ground level, antennas/cabinets levels, and levels above antennas/cabinets?
- b. All horizontal distances from the two proposed antennas and each of the "associated equipment cabinets" (including, but not limited to the immediate radius of the antennas/cabinets, several radii around the antennas/cabinets, e.g. 10 foot radius, 20 foot radius, 50 foot radius, 100 foot radius, 250 foot radius, 500 foot radius)?
- c. Do all such measurements of RF strength and power levels comply with FCC guidelines?
- 4. The notice states that the planning permits required are "Major Design Review and additional findings for Macro Telecommunications facilities within a residential zone." If such planning permits are granted to AT&T, what would happen in practical terms and what would the timeline be? In other words, would securing the planning permits at issue enable AT&T to have their plan reviewed and findings made by the City or do the permits enable AT&T to erect the antennas and "associate equipment cabinets" right away?

5. What requirements must AT&T meet to have the planning permits at issue granted by the City? In other words, what must AT&T prove to the City in order to get the necessary planning permits?

a. We believe the applicable City regulations are Oakland Planning Code Chapters 17.128 Telecommunications Regulations, 17.134 Conditional Use Permit Procedure, and 17.13 RH Hillside Residential Zones Regulations. Is this correct? Are there other applicable City regulations for this file?

b. Are there other applicable county, state, federal or other regulations for this file?

We understand we are asking for a lot of information, but this is very important to us, given the proximity of the proposed antennas and "associated equipment cabinets" to our home and the potential long-term effects on our neighborhood, neighbors and ourselves. We appreciate your prompt response as we need time to review the answers to our questions, ask follow-up questions and prepare for the September 17, 2014 hearing. Thank you.

Regards,

Melyssa Minamoto and Tom Garten 1300 Mountain Blvd. Oakland, CA 94611

Cell: (510) 846-3558 Email: melyssa@gmail.com

From:

Barbara Levin <mail@changemail.org>

Sent:

Saturday, September 13, 2014 7:05 AM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Barbara Levin Oakland, California

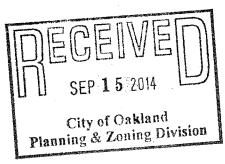
There are now 29 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA





From:

Eileen Karpfinger <mail@changemail.org>

Sent:

Sunday, September 14, 2014 9:12 AM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Eileen Karpfinger Oakland, California

There are now 30 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Judy Klein <mail@changemail.org>

Sent:

Sunday, September 14, 2014 3:57 PM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Judy Klein Oakland, California

There are now 31 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Teresa DB <mail@changemail.org>

Sent:

Monday, September 15, 2014 10:36 AM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett.

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Teresa DB Oakland, California

There are now 32 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Kevin Lowe <mail@changemail.org>

Sent:

Monday, September 15, 2014 10:58 AM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blyd" on Change.org.

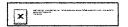
Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Kevin Lowe Oakland, California

There are now 33 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

richard kochenburger <mail@changemail.org>

Sent:

Thursday, September 25, 2014 5:23 PM

To:

Hackett, Maurice

Subject:

5 new petition signatures: richard kochenburger, Kathleen Young...

5 new people recently signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

There are now 104 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360

Dear Moe Hackett,

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

- 105. richard kochenburger oakland, California
- 104. Kathleen Young Oakland, California
- 102. Suzanne Yee Oakland, California
- 101. Duane Mowrer Oakland, California
- 100. William Wyatt Oakland, California



From:

Tina Finafrock <mail@changemail.org>

Sent:

Friday, September 26, 2014 7:22 AM

To:

Hackett, Maurice

Subject:

5 new petition signatures: Tina Finafrock, Stephanie Abel...

5 new people recently signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

There are now 110 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360

Dear Moe Hackett,

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

- 110. Tina Finafrock Oakland, California
- 109. Stephanie Abel Oakland, California
- 107. Tomi Kobara Oakland, California
- 106. Dolores Harshaw Oakland, California
- 105. richard kochenburger oakland, California



From:

Merkamp, Robert

Sent:

Friday, September 26, 2014 9:01 AM

To:

Hackett, Maurice

Subject:

FW: 5 new petition signatures: William Wyatt, Garrett Murphy...

Yours I believe

Robert D. Merkamp, Interim Development Planning Manager | City of Oakland | Bureau of Planning | 250 Frank H. Ogawa, Suite 2214 | Oakland, CA 94612 | Phone: (510)238-6283 | Fax: (510) 238-4730 | Email: rmerkamp@oaklandnet.com/planning

From: Rose, Aubrey

Sent: Friday, September 26, 2014 8:59 AM **To:** Schaaf, Libby; Merkamp, Robert; Miller, Scott

Subject: RE: 5 new petition signatures: William Wyatt, Garrett Murphy...

Thanks, but not my case.

From: Schaaf, Libby

Sent: Thursday, September 25, 2014 4:28 PM **To:** Merkamp, Robert; Miller, Scott; Rose, Aubrey

Subject: FW: 5 new petition signatures: William Wyatt, Garrett Murphy...

Hello gentleman,

Don't know if you saw this yet...

Lisa

For Libby Schaaf

From: William Wyatt [mailto:mail@changemail.org]
Sent: Thursday, September 25, 2014 1:24 PM

To: Schaaf, Libby

Subject: 5 new petition signatures: William Wyatt, Garrett Murphy...

5 new people recently signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

There are now 99 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=eb3f5aeaee14

Dear Libby Schaaf,

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

- 100. William Wyatt Oakland, California 99. Garrett Murphy Oakland, California 98. Marty Wehner Oakland, California 97. Alana Kapust Oakland, California

- 96. Scott Smith Oakland, California

From:

Micah Jones <mail@changemail.org>

Sent:

Thursday, September 25, 2014 6:52 AM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Micah Jones Oakland, California

There are now 43 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Citabria Phillips <mail@changemail.org>

Sent:

Thursday, September 25, 2014 6:56 AM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

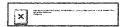
Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Citabria Phillips Oakland, California

There are now 44 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Hugh Stickney <mail@changemail.org>

Sent:

Thursday, September 25, 2014 7:03 AM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Hugh Stickney Oakland, California

There are now 45 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Nick Gower < mail@changemail.org>

Sent:

Thursday, September 25, 2014 7:17 AM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

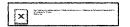
Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Nick Gower Oakland, California

There are now 46 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Nicole Keys <mail@changemail.org>

Sent:

Thursday, September 25, 2014 7:24 AM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

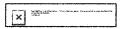
Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Nicole Keys Oakland, California

There are now 48 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Patricia Scott <mail@changemail.org>

Sent:

Thursday, September 25, 2014 7:20 AM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Patricia Scott Oakland, California

There are now 47 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Ted Bluey <mail@changemail.org>

Sent:

Thursday, September 25, 2014 7:50 AM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Ted Bluey Oakland, California

There are now 49 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Mimoha Karki <mail@changemail.org>

Sent:

Thursday, September 25, 2014 7:51 AM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Mimoha Karki Oakland, California

There are now 50 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Heidi Steklis <mail@changemail.org>

Sent:

Thursday, September 25, 2014 8:06 AM

To:

Hackett, Maurice

Subject:

5 new petition signatures: R Vijay, Heidi Steklis...

5 new people recently signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

There are now 56 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360

Dear Moe Hackett.

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

- 56. R Vijay Oakland, California
- 55. Heidi Steklis Oakland, California
- 54. Moorice Tarik El Oakland, California
- 53. Malcolm Askew Oakland, California
- 52. john roberts Oakland, California

×

From:

Julie Hollinger <mail@changemail.org>

Sent:

Thursday, September 25, 2014 8:19 AM

To:

Hackett, Maurice

Subject:

5 new petition signatures: Julie Hollinger, Chris Norris...

5 new people recently signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

There are now 59 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360

Dear Moe Hackett,

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

- 60. Julie Hollinger Oakland, California
- 59. Chris Norris Oakland, California
- 58. Rodney Reed Oakland, California
- 57. Maria Nelson Oakland, California
- 56. R Vijay Oakland, California

x

From:

Glenn Churchill <mail@changemail.org>

Sent:

Thursday, September 25, 2014 9:04 AM

To:

Hackett, Maurice

Subject:

5 new petition signatures: Linda Messinger, Vivian Tonsky...

5 new people recently signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

There are now 72 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360

Dear Moe Hackett,

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

- 72. Linda Messinger Oakland, California
- 71. Vivian Tonsky Oakland, California
- 70. Glenn Churchill Oakland, California
- 69. Mary Kathleen Welter Oakland, California
- 67. Andrea Byers Oakland, California

X

From:

Susan Love <mail@changemail.org>

Sent:

Thursday, September 25, 2014 9:39 AM

To:

Hackett, Maurice

Subject:

5 new petition signatures: Susan Love, Sonia Kalil...

5 new people recently signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

There are now 74 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360

Dear Moe Hackett,

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

- 75. Susan Love Oakland, California
- 74. Sonia Kalil Oakland, California
- 72. Linda Messinger Oakland, California
- 71. Vivian Tonsky Oakland, California
- 70. Glenn Churchill Oakland, California

Ľ

From:

Okiyo Ososaka <mail@changemail.org>

Sent:

Thursday, September 25, 2014 10:42 AM

To:

Hackett, Maurice

Subject:

5 new petition signatures: Mark Roberts, CHRISTOPHER MOURGOS...

5 new people recently signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

There are now 80 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360

Dear Moe Hackett,

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

- 79. Mark Roberts oakland, California
- 78. CHRISTOPHER MOURGOS OAKLAND, California
- 77. cory brott Oakland, California
- 76. Erne Peitso Oakland, California
- 75. Susan Love Oakland, California

From:

June Ko-Dial <mail@changemail.org>

Sent:

Thursday, September 25, 2014 11:14 AM

To:

Hackett, Maurice

Subject:

5 new petition signatures: June Ko-Dial, Leslie Wilson...

5 new people recently signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

There are now 84 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360

Dear Moe Hackett,

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

- 85. June Ko-Dial Oakland, California
- 84. Leslie Wilson Oakland, California
- 83. Jenny r Oakland, California
- 82. dennis monaghan oakland, California
- 81. Jon Rainwater Oakland, California



From:

Donald Kezar <mail@changemail.org>

Sent:

Thursday, September 25, 2014 11:41 AM

To:

Hackett, Maurice

Subject:

5 new petition signatures: Aileen Conley, Natalie Kilmer...

5 new people recently signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

There are now 89 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360

Dear Moe Hackett,

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

- 89. Aileen Conley Oakland, California
- 88. Natalie Kilmer Oakland, California
- 87. Ali Van Zee Oakland, California
- 86. Pat Walsh, United States
- 85. June Ko-Dial Oakland, California

x

From:

bruce gowdy <mail@changemail.org>

Sent:

Thursday, September 25, 2014 11:58 AM

To:

Hackett, Maurice

Subject:

5 new petition signatures: bruce gowdy, Annie Gardiner...

5 new people recently signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

There are now 94 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360

Dear Moe Hackett,

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

- 95. bruce gowdy oakland, California
- 94. Annie Gardiner Oakland, California
- 93. Sydnor Hain OAKLAND, California
- 92. Troy Windsor Oakland, California
- 91. Kathy Florence Oakland, California

From:

Brandon and Jennifer Wong <mail@changemail.org>

Sent:

Sunday, September 21, 2014 9:13 PM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

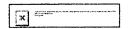
Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Brandon and Jennifer Wong Oakland, California

There are now 41 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

 $\frac{http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360$



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

elizabeth enright <mail@changemail.org>

Sent:

Sunday, September 21, 2014 9:35 AM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

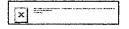
Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

elizabeth enright oakland, California

There are now 40 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Daniel Welper <mail@changemail.org>

Sent:

Saturday, September 20, 2014 5:34 PM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Daniel Welper Oakland, California

There are now 39 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Mary Lancaster < mail@changemail.org >

Sent:

Friday, September 12, 2014 1:53 PM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Mary Lancaster Oakland, California

There are now 28 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Brian Lowe <mail@changemail.org>

Sent:

Friday, September 12, 2014 8:50 AM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

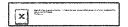
Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Brian Lowe Oakland, California

There are now 27 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



Item#2 Correspondence

Hackett, Maurice

From:

Wesley Selke <mail@changemail.org>

Sent:

Wednesday, September 10, 2014 9:14 AM

To:

Hackett, Maurice

Subject:

New petition to you: City of Oakland: Please stop the proposed installation of two AT&T

cell antenna towers near 1300 Mountain Blvd

Dear Moe Hackett.

Wesley Selke started a petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" addressed to you on Change.org that's starting to pick up steam.

Change.org is the world's largest petition platform that gives anyone, anywhere the tools they need to start, join and win campaigns for change. Change.org never starts petitions on our own – petitions on the website, like "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd", are started by users.

While "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" is active, you'll receive an email each time a signer leaves a comment explaining why he or she is signing. You'll also receive periodic updates about the petition's status.

Here's what you can do right now to resolve the petition:

Review the petition. Here's a link:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd

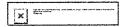
See the 5 signers and their reasons for signing on the petition page.

Respond to the petition creator by sending a message here: http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360

Sincerely, Change.org

There are now 5 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Aron nussbaum <mail@changemail.org>

Sent:

Wednesday, September 10, 2014 7:31 AM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

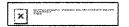
Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Aron nussbaum Oakland, California

There are now 4 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blyd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Vince Reeve <mail@changemail.org>

Sent:

Wednesday, September 10, 2014 9:14 AM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Vince Reeve Oakland, California

There are now 5 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blyd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Chelsea Torgersen-Bell <mail@changemail.org>

Sent:

Wednesday, September 10, 2014 9:30 AM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

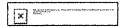
Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Chelsea Torgersen-Bell Oakland, California

There are now 7 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Norma Rotenberg <mail@changemail.org>

Sent:

Wednesday, September 10, 2014 9:51 AM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

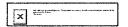
Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Norma Rotenberg oakland, California

There are now 8 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Tom Garten <mail@changemail.org>

Sent:

Wednesday, September 10, 2014 12:08 PM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

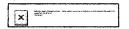
Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Tom Garten Oakland, California

There are now 9 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Heidi Bersin <mail@changemail.org>

Sent:

Wednesday, September 10, 2014 12:57 PM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

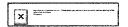
Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Heidi Bersin Oakland, California

There are now 10 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Jenifer Reeve <mail@changemail.org>

Sent:

Wednesday, September 10, 2014 1:09 PM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

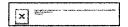
Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Jenifer Reeve Oakland, California

There are now 11 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Donald Lee <mail@changemail.org>

Sent:

Wednesday, September 10, 2014 1:46 PM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

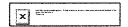
Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Donald Lee Oakland, California

There are now 12 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Jonathan Rizzardi <mail@changemail.org>

Sent:

Wednesday, September 10, 2014 2:50 PM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Jonathan Rizzardi Oakland, California

There are now 13 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

cecile franceschina <mail@changemail.org>

Sent:

Wednesday, September 10, 2014 3:21 PM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

cecile franceschina oakland, California

There are now 16 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Terence Judkins <mail@changemail.org>

Sent:

Wednesday, September 10, 2014 3:21 PM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Terence Judkins Oakland, California

There are now 15 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Stephanie McCloskey <mail@changemail.org>

Sent:

Wednesday, September 10, 2014 3:32 PM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Stephanie McCloskey OAKLAND, California

There are now 17 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Paul Sebexen <mail@changemail.org>

Sent:

Wednesday, September 10, 2014 3:35 PM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Paul Sebexen Oakland, California

There are now 18 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Larry Kelly <mail@changemail.org>

Sent:

Wednesday, September 10, 2014 4:42 PM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Larry Kelly Oakland, California

There are now 19 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Mary Warner < mail@changemail.org >

Sent:

Wednesday, September 10, 2014 7:33 PM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

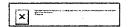
Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Mary Warner Oakland, California

There are now 20 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

 $\underline{\text{http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360}$



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

K Parikh <mail@changemail.org>

Sent:

Wednesday, September 10, 2014 8:35 PM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

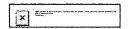
Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

K Parikh Oakland, California

There are now 21 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Douglas Hartman <mail@changemail.org>

Sent:

Wednesday, September 10, 2014 9:31 PM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

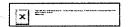
Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Douglas Hartman Oakland, California

There are now 22 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Jeannie Mckenzie <mail@changemail.org>

Sent:

Wednesday, September 10, 2014 11:02 PM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

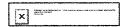
Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Jeannie Mckenzie Oakland, California

There are now 23 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Melyssa Minamoto <mail@changemail.org>

Sent:

Thursday, September 11, 2014 12:44 AM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Melyssa Minamoto Oakland, California

There are now 24 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Baron Braccia <mail@changemail.org>

Sent:

Thursday, September 11, 2014 5:39 AM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

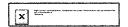
Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Baron Braccia Oakland, California

There are now 25 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Russell Bloom <mail@changemail.org>

Sent:

Thursday, September 11, 2014 10:32 AM

To:

Hackett, Maurice

Subject:

City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers

near 1300 Mountain Blvd

Dear Moe Hackett,

I just signed Wesley Selke's petition "Matt Yergovich: City of Oakland: Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd" on Change.org.

Please stop the proposed installation of two AT&T cell antenna towers near 1300 Mountain Blvd.

Sincerely,

Russell Bloom Oakland, California

There are now 26 signatures on this petition. Read reasons why people are signing, and respond to Wesley Selke by clicking here:

http://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd/responses/new?response=118dfcedb360



548 Market St #29993, San Francisco, CA 94104-5401, USA



From:

Hackett, Maurice

Sent:

Thursday, September 04, 2014 4:17 PM

To:

'Gmail'

Subject:

RE: Resident Questions re Planning Commission Public Notice, Case File No. PLN14036

Attachments:

DOC090414 (photo sims).pdf; DOC090414 (plans).pdf; DOC090414 (RF Report).pdf

Hi Melyssa and Thomas,

Sorry about the delay. I have been working on other cases for the bulk of the day.

The applicant prefers that I send the documentation.

Hope this is helpful.

Moe Hackett, Planner II | City of Oakland | Bureau of Planning | 250 Frank H. Ogawa, Suite 2114 | Oakland, CA 94612 | Phone: (510) 238-3973 | Fax: (510) 238-4730 | Email: mhackett@oaklandnet.com | Website: www.oaklandnet.com/planning

From: Gmail [mailto:melyssa@gmail.com] **Sent:** Thursday, September 04, 2014 11:55 AM

To: Hackett, Maurice **Cc:** Thomas Garten

Subject: Re: Resident Questions re Planning Commission Public Notice, Case File No. PLN14036

Hi Moe,

I saw that you forwarded my request following our conversation for AT&T's application and materials to Matt Yergovich yesterday. I'm hoping to receive them today because there's not much time for us to review and digest them before your staff report is released and before the hearing. If I don't hear from Matt by this afternoon, can you please email all the requested materials? I know you mentioned that sending them to me might crash your computer, but it's been a few days since I sent my initial request and time is of the essence.

Also, were you able to forward my email (below) to Matt? I haven't received a response from him yet. I directed these questions to him because it seemed from our conversation on Tuesday that you didn't have specific answers or information, but it would really help if you are able to find out these answers in light of how little time we have left before the staff report and hearing.

Thanks,

Melyssa

On Sep 3, 2014, at 1:37 AM, Melyssa Minamoto <melyssa@gmail.com> wrote:

Hi Moe,

Could you also have Matt email me with the answers to questions 1(c), 1(f), 2, and 3 of my original email? Can Matt include any location and design alternative analysis that AT&T conducted for our proposed sites?

Additional questions I have for Matt, based on our conversation today, are as follows:

- A. What is the weight of the antenna on the west utility pole? What is the weight of the associated equipment box on the east utility pole?
- B. Has AT&T done a structural or stability analysis on each of these utility poles?
- C. Has AT&T done a fire safety, strong wind, or seismic analysis for the antennas and equipment box on the poles?
- D. Will the antennas attract lightening?
- E. If the utilities go underground, what will AT&T then do with the antenna and the associated equipment box?

I appreciate you passing this on.

Thanks,

Melyssa

On Tue, Sep 2, 2014 at 6:23 PM, Gmail < melyssa@gmail.com > wrote: Hi Moe,

Thanks for calling me today. Can you please have Matt Yergovich from AT&T email me a PDF of their application and all materials in support of their application?

Thanks,

Melyssa

On Aug 31, 2014, at 3:38 PM, Melyssa Minamoto < melyssa@gmail.com > wrote:

Mr. Moe Hackett

Planner II

City of Oakland Bureau of Planning

mhackett@oaklandnet.com

Ms. Libby Schaaf

Oakland City Councilmember, District 4

Ischaaf@oaklandnet.com

This week we received a City of Oakland public notice regarding File No. PLN14036 ("Public right-of-way adjacent to: 1244, 1265, & 1300 Mountain Boulevard") adjacent to our property (within a foot of our mailbox). Respectfully, the notice lacks specificity, uses vague and confusing language, and seems to be missing important information when read in conjunction with the photo on the notice. We hope that you are able to cure some of these defects by answering the following questions:

- 1. The notice states the proposal is "To install a new macro telecommunications facilities (2 antennas and associated equipment cabinets) on two existing utility poles." The photos accompanying the notice show what appears to be one antenna extending on top of the utility pole on the east side of Mountain Blvd. and one "associated equipment cabinet" mounted on the middle of the utility pole on the west side of the street.
- a. Where is the other antenna depicted in the photo? Also, where are the other "associated equipment cabinets" depicted in the photo?
- b. What are the dimensions of the proposed antenna on the east side of the street and how far does it extend above the utility pole? What would be the total height of the utility pole with the proposed antenna?
- c. What exactly is an "associated equipment cabinet"? What is inside the proposed cabinet at issue and how do those components function?
 - d. What are the dimensions of the proposed "associated equipment cabinet"?
- e. Where exactly on the west utility pole will the proposed "associated equipment cabinet" be placed?
- f. Can you point us to another Oakland Hills location where the same equipment has already been installed so we can see it?
- 2. Can you please provide us with a complete copy of AT&T's application for the planning permits required (including, but not limited to supporting materials, maps, studies, technical specifications, and communications regarding this application)?
- 3. Due to the Oakland Hills topography and positioning of homes on our street at different heights, can you please provide us with measurements of the electromagnetic radio-frequency (RF) field strength for the following:
- a. All vertical levels around the two proposed antennas and each of the "associate equipment cabinets" (including, but not limited to ground level, antennas/cabinets levels, and levels above antennas/cabinets?
- b. All horizontal distances from the two proposed antennas and each of the "associated equipment cabinets" (including, but not limited to the immediate radius of the

From:

Thomas Garten <tomgarten@yahoo.com>

Sent:

Monday, September 15, 2014 4:10 PM

To:

Matt Yergovich; myergo@gmail.com; Hackett, Maurice; Pattillo, Chris; Moore, Jim;

jahazielbonillaoaklandpc@gmail.com; Coleman, Michael;

jmyres.oaklandplanningcommission@gmail.com; nagrajplanning@gmail.com; ew.oakland@gmail.com; dist5@acgov.org; Schaaf, Libby; Ruhland, Lisa; Stoffmacher,

Bruce; Melyssa Minamoto; Cowan, Richard

Subject:

Re: Residents' Opposition Brief for PLN-14036, Set for Hearing on Sept. 17

Attachments:

Part 2 of 2 - Exhibits 11-21 to Opposition Brief.pdf

Attached please find Exhibits 11-21. There are no additional exhibits.

-Tom

On Monday, September 15, 2014 4:08 PM, Thomas Garten < tomgarten@yahoo.com > wrote:

All:

A Public Hearing on Case File No. PLN-14036 is set to take place on Wednesday, September 17th. On behalf of concerned residents, attached please find an opposition brief to AT&T's proposal to construct a macro telecommunications facility on two existing utility poles on Mountain Boulevard. We hope that the Planning Commission and public officials consider the arguments set forth in the attached before making a decision about whether to approve AT&T's proposal.

Best regards,

Tom Garten & Melyssa Minamoto 1300 Mountain Boulevard Oakland, CA 94611

ATTACHMENTS:

- (1) Opposition Brief to Planning Commission
- (2) Exhibits 1-10 (one PDF)
- (3) Exhibits 11-21 (one PDF, sent by separate email)

CC:

Oakland Planning Commission
Matt Yergovich (Applicant's Representative)
Maurice Hackett (Planner)
Libby Schaaf (District 4 Councilmember)
Keith Carson (District 5 County Supervisor)
Richard Cowan (Special Assistant to Mayor Jean Quan)

CITY OF OAKLAND PLANNING COMMISSION September 17, 2014 Meeting

CASE FILE NO. PLN-14036

Proposal:

"To install a new macro telecommunications facilities (2 antennas and associated equipment cabinets) on two existing utility poles."

OPPOSITION BRIEF FROM CONCERNED RESIDENTS

On behalf of concerned residents located near AT&T's proposed project adjacent to 1265, 1244, and 1300 Mountain Boulevard ("Residents"), we submit this brief in opposition to the proposed project. There is significant (and growing) opposition to AT&T's proposal, as demonstrated by a petition that presently includes more than 30 signatures from residents that decidedly oppose AT&T's application for PLN-14036.1

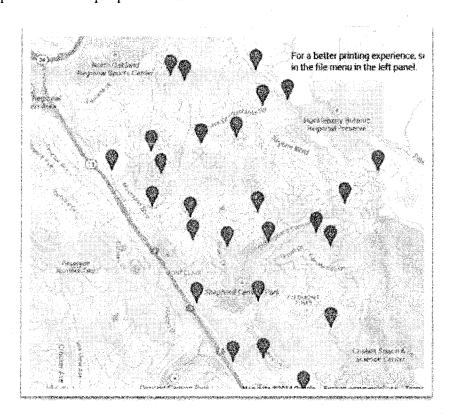
I. BACKGROUND

On Wednesday, August 27, 2014, a "Planning Commission Public Notice" was posted next to a utility pole located between 1244 and 1300 Mountain Boulevard. The Notice states that nearly six months ago, on March 6, 2014, AT&T filed an application to "install a new macro telecommunications facilities (2 antennas and associated equipment cabinets) on two existing utility poles" located in the public right-of-way. Under the proposal, the height of the utility pole on the west side will increase by approximately 8 feet to

¹ See https://www.change.org/p/matt-yergovich-city-of-oakland-please-stop-the-proposed-installation-of-two-at-t-cell-antenna-towers-near-1300-mountain-blvd.

accommodate two antennas. An associated equipment cabinet, measuring 8 feet tall, 2 feet wide, and 2 feet deep, will be attached to the utility pole on the east side. Residents were informed that a public hearing would take place just three weeks later, on Wednesday, September 17, 2014. No person owning real property within 300 feet of the proposed project site received notice via mail.

Residents have learned that AT&T plans to install 32 Distributed Antenna System ("DAS") Nodes in the Oakland Hills, the vast majority of which are located in residential zones. The map below, which was created using the locations set forth in AT&T's RF Report, depicts 26 of the proposed DAS sites:



See Exhibit 2. Residents in a number of affected neighborhoods have already appeared before the Planning Commission to speak out against several of the proposed DAS Nodes.

There are numerous appeals to the Oakland City Council pending, each filed at a cost of nearly \$1,400.00. The Residents join in the opposition to the proposed project.

II. DISCUSSION

A. The City Failed To Provide Residents With Proper Notice.

The Oakland Planning Code states that projects that are subject to Design Review, such as AT&T's proposal for PLN-14036, require that notice be given to affected residents. The law states that notice must be given in two separate ways: (1) by posing an "enlarged notice" that is "clearly visible from the street"; and (2) by mail or delivery to all persons owning real property within 300 feet of the project site:

Notification Procedures. Notice shall be given by posting an enlarged notice at a location on the project site that is clearly visible from the street, alley, or private way providing access to the subject lot. Notice shall also be given by mail or delivery to all persons shown on the last available equalized assessment rolls owning real property in the City within three hundred (300) feet of the project site....

Planning Code Ch. 17.136.040.

In this case, the City failed to comply with its own law. No person owning real property within 300 feet of the proposed project site received notice via mail or delivery. The "Planning Commission Public Notice" signage, shown in Exhibit 2, was small and easy to overlook. The yellow laminated sign measures approximately 24 inches x. 15 inches. No other signage was posted by the City. During our outreach efforts over the past two weeks, many neighbors who we spoke with commented that they never saw the sign and were not aware of AT&T's application.

On September 6, 2014, the Residents wrote to the Planning Commission to request a postponement of the September 17 public hearing. *See* Exhibit 3. The Residents requested

a postponement for a variety of reasons, including to be allowed time to communicate with neighbors about AT&T's proposal, to understand precisely what equipment would be installed under the proposal and what laws govern the application, to learn whether AT&T had considered alternatives, and to make inquiries with various public officials regarding the proposal. *See id.* The Residents never received a response.

By ignoring the notification procedures set forth in the Oakland Planning Code, the City has deprived the Residents of due process. On this ground alone, the Commission should deny the application.

B. The Proposed Telecommunications Facilities Fail To Comply With The Applicable Laws.

1. A Conditional Use Permit Is Required

Staff has taken the incorrect position that AT&T's application may be granted so long as it complies with the Regular Design Review criteria (Ch. 17.136.050) and a subset of the Telecommunications Regulations (Ch. 17.128). *See* Exhibit 4 (Staff Report). In fact, a Conditional Use Permit ("CUP") is required, and, without such a permit, AT&T's application must be denied.

The City of Oakland's Planning Code, Section 17.128 "Telecommunications

Regulations," plainly states that a CUP is required for *any* telecommunications facility that that is located in or within 100 feet of a residential zone:

Any Telecommunications Facility shall not be permitted in, or within one hundred (100) feet of the boundary of, any residential zone, HBX Zone, or D-CE-3 or D-CE-4 Zone, except upon the granting of a conditional use permit pursuant to the conditional use permit procedure in Chapter 17.134.

Planning Code Ch. 17.128.025.A. Here, the proposed equipment will be located within Hillside Residential Zone RH-4. Accordingly, AT&T is required to apply for, and obtain, a

CUP. It has not done so.

The Residents raised this issue with Mr. Hackett, the case planner for AT&T's application and author of the Staff Report. Mr. Hackett explained that a CUP is not required because "the site/poles are within the public right-of-way." *See* Exhibit 5. But this interpretation cannot be correct, as there is no such carve-out in the Telecommunications Regulations, nor are the Residents aware of any other law that would provide the City with the right to circumvent regulations tied to residential zones merely because the utility poles are located directly in front of houses in the public right-of-way. Indeed,

Councilmember Libby Schaaf's office has prepared a "Telecommunications/Cell Phone Tower Fact Sheet" that confirms that the Residents' interpretation of the Planning Code is the correct one—it states that all applications must undergo the CUP review process. 3

If AT&T should argue that California Public Utilities Code Section 7901 provides a hook to circumvent the CUP review process, any such argument fails. Section 7901 provides authority for companies to "erect poles, posts, piers, or abutments . . . at such points as not to incommode the public use of the road or highway" But the Ninth Circuit Court of Appeals has held that this right is not unfettered. A city may "exercise reasonable control as to the time, place and manner" in which the public right-of-way is used, including by regulating wireless telecommunications facilities based on grounds such as aesthetics. See Sprint PCS Assets, LLC v. City Council of the City of Palos Verdes Estates,

² See "Wireless Telecommunications Facilities FAQs From the Office of Councilmember Libby Schaaf," available at http://www.safeoakland.com/events/past-events/telecommunications/cell-phone-tower-fact-sheet.

³ The Residents sought clarification from the Oakland City Attorney regarding the applicable legal provisions. *See* Exhibit 6. To date, the Residents have not received a response.

583 F.3d 716 (9th Cir. 2009). Just as the City of Oakland may subject such applications to Design Review, those same applications may be subjected to the CUP review process.

2. A Site Alternative Analysis Is Required

The Telecommunications Regulations specify a ranked preference for the location of new wireless facilities. *See* Planning Code Ch. 17.128.110. Staff has incorrectly concluded that AT&T's application does not require a site alternatives analysis, apparently because the proposed equipment is to be located on: "B. City-owned properties or other public or quasi-public facilities." *See* Exhibit 4 at p.5. The utility poles, however, are not "properties" of the City of Oakland; rather, they are owned by PG&E (and now AT&T). Nor are the utility poles "quasi-public facilities." Accordingly, the B ranked preference does not apply.

There can be no dispute that the utility poles are located in a residential zone. In view of that fact, the only proper conclusion is that AT&T has proposed that the equipment be located on one of the following sites:

- D. Existing commercial or industrial structures in residential zones, HBX Zones, or the D-CE-3 or D-CE-4 Zones.
- E. Other non-residential uses in residential zones, HBX Zones, or the D-CE-3 or D-CE-4 Zones.

Planning Code Ch. 17.128.110. Read in context, it is clear that the purpose of the Code is to subject projects located in residential zones to higher scrutiny. The Code states that facilities to be located in D or E require a site alternatives analysis as part of the application materials. *Id.* The analysis must identify alternative sites located within 1,000 feet of the proposed location, and provide written evidence indicating why any identified alternatives cannot be used. AT&T has not complied with this requirement.

The Residents are troubled by the fact that the City has not required AT&T to

demonstrate a gap in wireless coverage for AT&T customers in the areas that the proposed site will serve. In addition, the Residents do not understand why AT&T cannot expand its coverage in the Oakland Hills through less intrusive means—e.g., expanding the use of microcells, locating the proposed antennas in non-residential zones—and respectfully suggest that there has been a failure on the part of the City and AT&T to balance the concerns of the Residents with the aim to expand wireless service for AT&T's customers.

3. A Site Design Alternative Analysis Is Required

The Telecommunications Regulations specify that new wireless facilities shall be designed in an order of preference. *See* Planning Code Ch. 17.128.120. Staff has incorrectly concluded that AT&T's application does not require a site design alternatives analysis. *See* Exhibit 4 at p.5. Most notably, Staff determined that the application does not require an alternatives analysis because the wireless facility design is categorized as "A. Building or structure mounted antennas completely concealed from view." *See id.* This finding was the sole basis for the Staff's determination that a site design alternatives analysis is not required. And yet, the Staff Report concedes that this criteria is not satisfied by AT&T's proposal because the antennas and equipment cabinet are *in plain view* on the utility poles. The antenna includes an 8 foot *extension* to the west utility pole, and the 8 foot tall equipment cabinet is to be mounted to the east utility pole. It is impossible to conclude that this equipment is "completely concealed from view."

Wireless facilities that are not designed to meet an A or B ranked preference, such as AT&T's proposed equipment, require a site design alternatives analysis. *See* Planning Code Ch. 17.128.120. The analysis must provide written evidence indicating why each higher preference design alternative cannot be used. *Id.* AT&T has not complied with this

requirement.

C. The Residents Are Concerned That The Proposed Telecommunications Facilities Pose A Safety Risk.

The stability of the affected utility poles is questionable, and the addition of the proposed AT&T equipment may pose a safety risk to the neighborhood. Both utility poles are already leaning significantly toward the south, and the pole on the east side requires a metal beam to support the existing power lines and street light. *See* Exhibit 7. In addition, the poles are located within inches of existing vegetation. *See id.* The application materials do not suggest that AT&T has considered the structural stability of the poles, and this is a great concern to the Residents.

As we all know, there are a variety of hazards in the Oakland Hills—most notably the threat of an earthquake, fire, or wind storm. In November 2011, a large tree located just 10 feet from the east utility pole fell onto the driveway of 1300 Mountain Boulevard. See Exhibit 8. If the utility poles were to topple over, the risk of damage and/or fire is substantial, especially in view of the fact that the proposed equipment is in close proximity to surrounding vegetation. This concern is not merely speculative, as there have been numerous documented cases of cell tower collapses and associated fires, including the memorable 2007 fire in Malibu, California. See Exhibits 9 & 10. In the Malibu incident AT&T added wind-catching cables and antennas to existing wooden utility poles, but no entity kept track of the weight and wind-load dangers to ensure that the poles remained safe. See Exhibit 9. There are similar risks associated with the proposed AT&T project on Mountain Boulevard, given that neither AT&T nor PG&E have provided assurances that the existing wooden utility poles are structurally sound with the addition of the proposed antenna equipment and the 8 foot tall by 2 foot wide equipment cabinet.

The Residents have attempted to engage Oakland's Assistant Fire Marshall on this topic, but have not yet had an opportunity to discuss the matter with him in any detail as of yet. *See* Exhibit 11.

D. The Proposed Telecommunications Facilities Are Inconsistent With The Character Of The Neighborhood And May Negatively Impact Property Values.

The Residents believe that the proposed equipment is inconsistent with the natural character, look, and feel of our neighborhood. Although nearby Residents do not have Bay Views, many of the homes on the east side of Mountain Boulevard have views of the surrounding hills and foliage. These views will be degraded if AT&T is permitted to (1) increase the height of the utility pole on the west side by approximately 8 feet, and add an 8 foot by 2 foot equipment box on the utility pole on the east side. The Residents have provided examples of the existing views from nearby homes in exhibits attached hereto, including those that have street-facing balconies that provide a scenic view of the surrounding hills. See Exhibit 12 (views from 1300 Mountain Blvd.); Exhibit 13 (views from 1310 Mountain Blvd.). In addition, Mountain Boulevard is a popular route for Residents to walk to Montclair Village, to the Sunday Farmer's Market, and to Lake Temescal. The proposed equipment is plainly visible from both the north and the south sides of the street corridor. See Exhibit 14.

Because the proposed telecommunications facilities are inconsistent with the character of the neighborhood, as described immediately above, it is likely that the addition of the facilities would negatively impact property values. Depressed housing prices result in decreased property taxes and less money generated for the City of Oakland. Furthermore, parents may move or think twice about buying homes in this community,

resulting in decreased student enrollment and less school funding.

There are a number of studies that suggest that telecommunication facilities have adversely affect property values, including:

- "Cell Phone Tower Proximity Impacts On Housing Prices: A New Zealand Case Study," Pacific Rim Property Research Journal, Vol. 13, No. 1. See Exhibit 15.
- "The Impact of Cell Phone Towers on House Prices in Residential Neighborhoods," Appraisal Journal, June 22, 2005. See Exhibit 16.
- "Cellular Phone Towers: Perceived Impact on Residents and Property Values" Pacific Rim Property Research Journal, Vol. 11, No. 2. See Exhibit 17.

In addition, according to FHA policies for home loans, lenders consider wireless communications facilities to be a nuisance, and appraisers must indicate whether homes are located in the "fall zone" of such a facility. *See* Exhibit 18. A similar rationale could be applied by insurance companies to justify an increase in premiums.

E. Although Health Risks Are Not A Basis For Denying AT&T's Application, The Residents Wish To Voice Their Concerns On This Topic.

Section 704 of the Telecommunications Act of 1996 does not permit municipal regulation of wireless communication facilities on the basis of the environmental effects of radio frequency ("RF") emissions. Accordingly, the Residents expressly do not rely upon such concerns as a basis for challenging AT&T's proposal. All of the arguments raised in Sections II.A.-II.D., above, provide substantial evidence to defeat AT&T's application. Nevertheless, the Residents are not prohibited by law from expressing their concerns on the subject of health hazards, and will do so here.

The FCC safety standards are outdated and incomplete. "[T]he FCC standards for radio-frequency emissions are based on thermal effects, or the RF's ability to heat tissue, in the same way a microwave oven cooks food. But the case for *non*-thermal hazards from RFs

is substantial," and includes "alarming effects: numerous cancers, immune system suppression, and birth defects, among others." *See* Exhibit 19 at p.3 (Levitt, B. Blake "Cell-Phone Towers and Communities: the Struggle for Local Control"). The FCC standards do not even consider non-thermal effects of RF exposure, and safe levels have not yet been established for RF exposure with a nonthermal effect. This failure has caused the International Association of Firefighters to oppose the use of fire stations as base stations for wireless facilities "until a study with the highest scientific merit and integrity on health effects of exposure to low-integrity on health effects of exposure to low-intensity RF radiation is conducted and it is proven that such sightings are not hazardous to the health of our members." *See* Exhibit 20. The Association's decision was based on the "large body of internationally accepted scientific evidence which points to the existence of non-thermal effects of RF radiation." *Id*.

Moreover, it has been shown that "biological effects depend on how much of the energy is absorbed into the body of a living organism, not just what [emissions] exist in space." See Exhibit 21 at p.373 (Levitt, B. Blake and Henry Lai "Biological Effects from Exposure To Electromagnetic Radiation Emitted By Cell Tower Base Station and Other Antenna Arrays"). For example, "Children absorb energy differently than adults because of differences in their anatomies and tissue composition." Id.

While studies regarding the health risks posed to those living among wireless telecommunications facilities are ongoing, the Residents strongly believe that erring on the side of caution is the right thing for the City of Oakland to do. We encourage the City to push AT&T to demonstrate that locating the telecommunications facilities in front of homes is truly necessary, both because a gap in wireless coverage exists and because there is no

viable alternative site nearby.

III. CONCLUSION

These issues are of the utmost importance to our families, and we cannot overstate how deeply affected and how strongly we are opposed to AT&T's application. We hope that our objections will be thoughtfully considered and noted by the Planning Commission.

Respectfully Submitted,

Concerned Residents

TABLE OF EXHIBITS

No.	Description of Exhibit
1	Map Showing 32 Proposed DAS Nodes in the Oakland Hills
2	Photos of Public Notice
3	Request to Postpone Hearing, dated 9/5/2014
4	Staff Report for PLN14036, dated 9/13/2014
5	Email Correspondence with Mr. Hackett re: Legal Standards
6	Email to Oakland City Attorney Seeking Clarification of Legal Standards
7	Photos of Utility Poles
8	Photo of Fallen Tree at 1300 Mountain Boulevard
9	"Power Poles Toppled with Communications Gear Go Unchecked," dated 4/23/2009
10	Cell Tower Fires and Collapsing Towers, EMR Institute
11	Email to Assistant Fire Marshall Griffin re: Safety Concerns
12	Photos of Oakland Hills views from 1300 Mountain Blvd.
13	Photos of Oakland Hills views from 1310 Mountain Blvd.
14	Photos of the View Corridor
15	"Cell Phone Tower Proximity Impacts on House Prices: A New Zealand Case Study"
16	"The Impact of Cell Phone Towers on House Prices in Residential Neighborhoods," Summer 2005
17	"Cellular Phone Towers: Perceived Impact on Residents and Property Values"
18	"Homeownership Center Reference Guide," Housing and Urban Development
19	"Cell-Phone Towers and Communities: The Struggle for Local Control"
20	"Position on the Health Effects from Radio Frequency/Microwave (RF/MW) Radiation in Fire Department Facilities from Base Stations for Antennas and Towers for the Conduction of Cell Phone Transmissions," International Association of Fire Fighters
21	"Biological Effects from Exposure to Electromagnetic Radiation Emitted By Cell Tower Base Stations and Other Antenna Arrays"

EXHIBIT 1

AT&T - 32 Proposed DAS Nodes in the Oakland HIIIs

Grizzly Peak Blvd. & Golf

Untitled layer

Course Dr.

2501 Grizzly Peak Blvd

8071 Claremont Ave 7541 Claremont Ave

6616 Pine Needle Dr 1265 Mountain Blvd

5925 Sherwood Dr

5612 Merriewood Dr 5658 Grisborne Ave

1732 Indian Way

5826 Mendoza Dr

2400 Manzanita Dr

2040 Tampa Ave

6133 Snake Rd

6433 Westover Dr

6837 Aitken Dr



AT&T Mobility is in the process of building 32 Distributed Antenna System (DAS) Nodes in the Oakland Hills. The proposed sites are marked with a pin in the map.

2679 Mountaingate Way

10 El Patio St

5879 Scarborough Dr

2181 Andrews St

6758 Saroni Dr

2997 Holyrood Dr

🎙 95 Castle Park Way

S343 Crane Way

6925 Pinehaven Rd

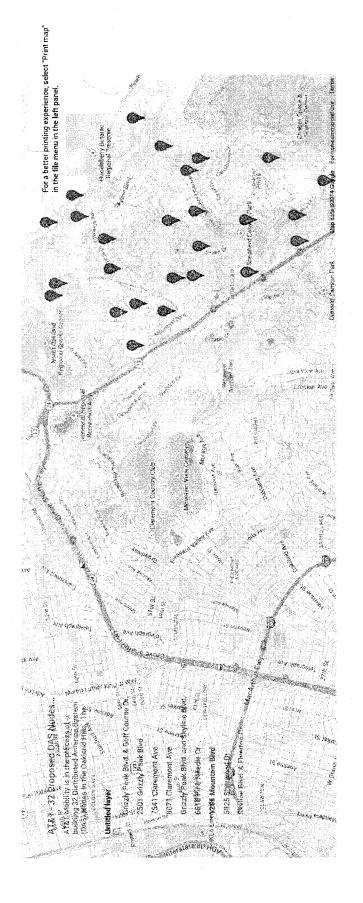
6776 Thornhill Dr6659 Girvin Dr

7380 Claremont Ave

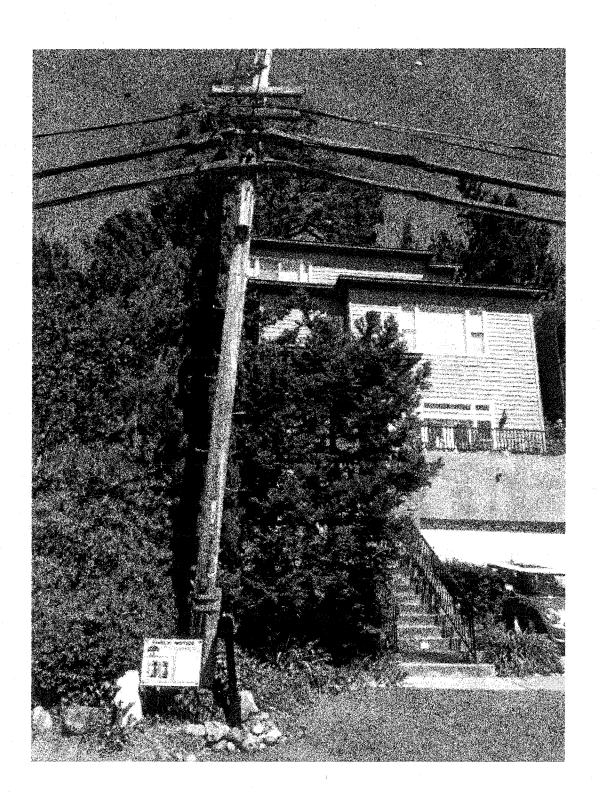
🗣 6757 Sobrante Rd

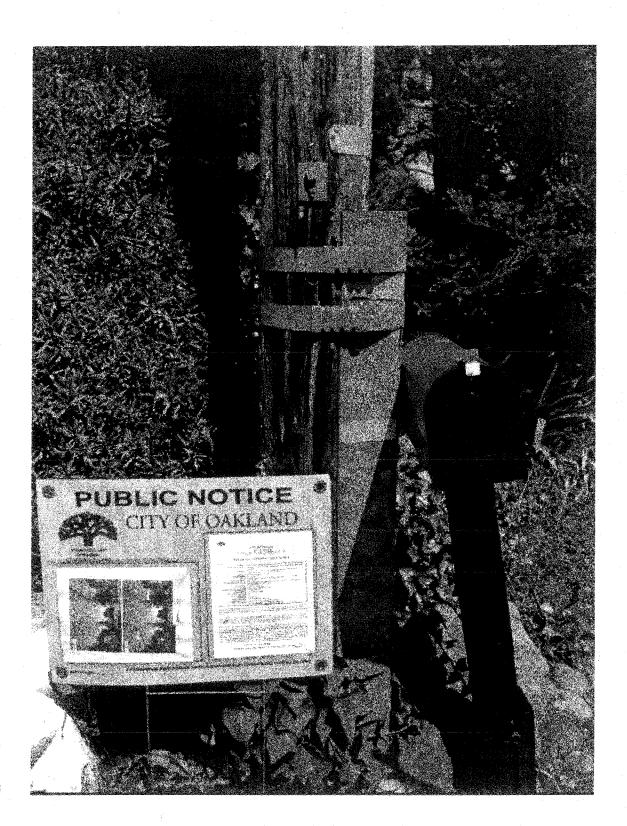
Shepherd Canyon Rd. & Escher Or

AT&T - 32 Proposed DAS Nodes in the Oakland HIlls



9/14/2014









Request to Postpone Hearing for Case File No. PLN14036

Thomas Garten <tomgarten@yahoo.com>

Fri, Sep 5, 2014 at 5:30 PM

Reply-To: Thomas Garten <tomgarten@yahoo.com>

To: Matt Yergovich <myergovich@extenetsystems.com>, "myergo@gmail.com" <myergo@gmail.com>, Maurice <MHackett@oaklandnet.com>, "pattillo@pgadesign.com" <pattillo@pgadesign.com>, "jmoore.ocpc@gmail.com" <jmoore.ocpc@gmail.com>, "jahazielbonillaoaklandpc@gmail.com" <jahazielbonillaoaklandpc@gmail.com>, "michael@mbcarch.com>, "jmyres.oaklandplanningcommission@gmail.com" <jmyres.oaklandplanningcommission@gmail.com" <jmyres.oaklandplanningcommission@gmail.com>, "nagrajplanning@gmail.com" <nagrajplanning@gmail.com>, "ew.oakland@gmail.com" <ew.oakland@gmail.com>, "dist5@acgov.org" <dist5@acgov.org>, "lschaaf@oaklandnet.com" <lschaaf@oaklandnet.com>, Melyssa Minamoto <melyssa@gmail.com>, "Iruhland@oaklandnet.com" <lru>| clruhland@oaklandnet.com>

Dear Planning Commission:

On behalf of ourselves and interested neighbors, we write to request that you postpone the public hearing for Case File No. PLN14036, which is presently scheduled to take place on Wednesday, September 17, 2014. Case File No. PLN14036 is a proposal "install a new macro telecommunications facilities (2 antennas and associated equipment cabinets) on two existing utility poles."

A postponement of this matter is appropriate for several reasons:

- 1. The City failed to provide notice via mail to all persons owning real property within 300 feet of the project site, as is required by the City's own laws. See, e.g., Planning Code Ch. 17.136.040. The only notice provided to the community was a small sign on a post located in front of the utility pole at 1300 Mountain Boulevard, which was placed there on August 27. After visiting with some neighbors, many have commented that they did not see the sign at all.
- 2. Although it appears that AT&T applied for the project in March 2014, the affected residents have only recently learned about AT&T's application. The affected residents need time to learn, among other things, about the scope of the project, the applicable laws, the steps that AT&T has (and has not taken) to study the safety of the project. This is especially important, given that the City's laws appear to preclude residents from raising new arguments on appeal. Residents should be given the opportunity to put their best case forward in front of the Commission; it is not enough to say that the decision is subject to appeal, given that any appeal comes at a cost of approximately \$1,400.00.
- 3. By separate emails, we have sought additional information and requested input from other agencies. For example, we emailed the City Attorney's office to obtain clarification regarding whether a Conditional Use Permit is required. (We believe that at CUP is required.) We contacted the Oakland Fire Department and the California PUC to seek information and input regarding the stability of the utility poles on which AT&T plans to locate the equipment. We have requested from AT&T and the City any analysis of proposed alternatives, including the possibility that AT&T could instead co-locate its equipment on an existing tower that is owned and operated by other carriers (e.g., the tower at 2220 Mountain Boulevard). We have not yet received a response to these requests, which were made only within the past few days. We request time to obtain the information that we have requested. The Staff's Report -- in which a recommendation for or against the project will be made -- is due in less than one week. We would like our evidence considered.
- 4. Over the past week, we have diligently attempted to get the word out about AT&T's proposed project on Mountain Boulevard. We continue to speak with our neighbors, and are in the process of preparing a petition against AT&T's application. We would like time to complete that process so that opposition by the community may be considered by the Commission.

As you can imagine, this process is incredibly stressful for the residents. At the time the notice was posted, we had no familiarity with the applicable laws, the procedures of the Planning Commission, or the technical lingo describing AT&T's project. We have attempted to learn what we can in the limited time that we have been given -- all the while balancing our normal obligations to work and family. I assume that the City's laws regarding notice exist to ensure that there is due process. We are concerned that the current "fast-track" approach does not serve that important purpose.

Best Regards,

Tom Garten & Melyssa Minamoto 1300 Mountain Boulevard Oakland, CA 94611

cc: Oakland Planning Commissioncc: Matthew Yergovich (Applicant)

cc: Moe Hackett (Planner II)

cc. Libby Schaaf (District 4 Representative)

cc: Keith Carson (District 5 County Supervisor)



September 17, 2014 Case File Number: PLN14036

1265 Mountain Boulevard (located in the Public Right-of-

Location: Way adjacent to 1265, 1244, & 1300 Mountain Boulevard

(See map on reverse)

Adjacent to APN: 048G-7418-023-01, 048G-7404-018-00, **Assessors Parcel Number:**

and 048G-7418-062-00,

Proposal: Placement of two (2) antennas on a PG&E utility pole on the west

> side of the street and associated equipment on a separated PG&E utility pole directly across the street (the east side of Mountain Blvd.)

this is a Macro Telecommunication facility.

Applicant:

Matt Yergovich & Associates LLC for AT&T

Contact Person/ Phone

Matt Yergovich (415)596-3474

Number:

PG&E & New Cingular Wireless PCS, LLC Joint Utility Pole located Owner:

in the City of Oakland Public right of way

Case File Number: PLN14036

Planning Permits Required: Regular Design Review for the replacement of two (2) antennas; one (1)

new Radio Remote Unit (RRU), and new associated equipment on two

existing utility poles in the public right of way

Macro telecommunication facility within 100 feet of a residential zone.

General Plan: Hillside Residential

> RH-4 Hillside Residential Zone-4 Zoning:

Exempt, Sections 15301 and 15303of the State CEQA Guidelines; **Environmental Determination:**

minor additions and alterations to existing structures and new small

Section 15183 of the State CEQA Guidelines; projects consistent with

a community plan, general plan or zoning.

Historic Status: No Historic Record

Service Delivery District:

City Council District: 4

Date Filed:

3/6/14 Finality of Decision:

Appealable to City Council within 10 days

Contact case planner Moe Hackett at (510) 238-3973 or For Further Information:

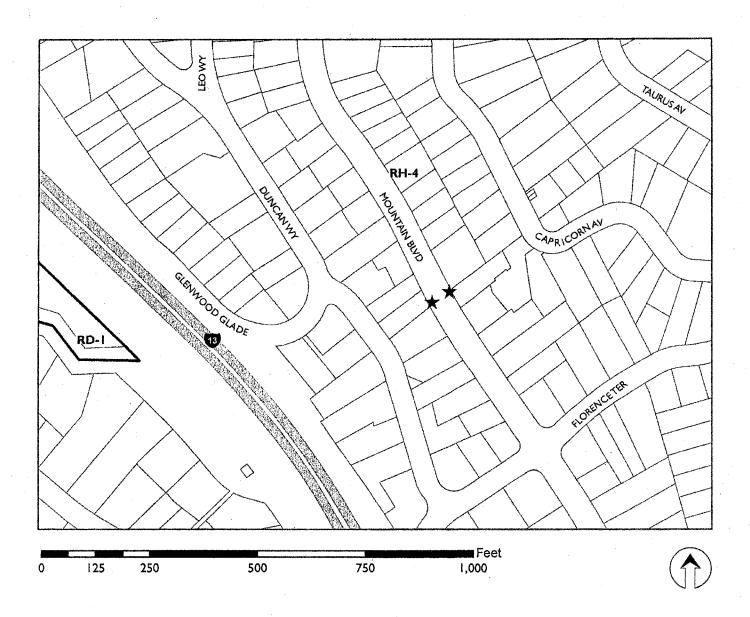
mhackett@oaklandnet.com

SUMMARY

This project would provide for the establishment of a macro telecommunications facility consisting of two (2) antennas, one (1) Radio Unit, and other associated equipment cabinets to be located on two existing utility poles within the public right of way. The poles are operated by PG&E and exist within a joint pole authority of which PG&E & New Cingular Wireless PCS, LLC are members.

Major Design Review is required for the creation, expansion and alterations of a Macro telecommunications facility involving modifications to existing utility poles located in or within 100' of a residential zone. As detailed below, the project meets all of the required findings for approval. Therefore, staff recommends approval of the project subject to the attached conditions of approval.

CITY OF OAKLAND PLANNING COMMISSION



Case File: PLN I 4036

Applicant: Matt Yergovich (for: AT&T) Address:

Public right-of-way adjacent to

1244, 1265 and 1300 Mountain Boulevard

RH-4 Zone:

Case File Number: PLN14036

Page 3

PROJECT DESCRIPTION

This project would provide for the establishment of a Macro telecommunication facility consisting of two (2) antennas on an existing utility pole on the west side of Mountain Boulevard and associated utility pole mounted equipment on a second utility pole located on the east side of the street. The project would also allow for one (1) radio unit. The existing poles are located in the public right-of-way approximately mid-way on the block of Mountain Boulevard between Broadway Terrace and Florence Terrace.

TELECOMMUNICATIONS BACKGROUND

Limitations on Local Government Zoning Authority under the Telecommunications Act of 1996

Section 704 of the Telecommunications Act of 1996 (TCA) provides federal standards for the siting of "Personal Wireless Services Facilities." "Personal Wireless Services" include all commercial mobile services (including personal communications services (PCS), cellular radio mobile services, and paging); unlicensed wireless services; and common carrier wireless exchange access services. Under Section 704, local zoning authority over personal wireless services is preserved such that the FCC is prevented from preempting local land use decisions; however, local government zoning decisions are still restricted by several provisions of federal law.

Under Section 253 of the TCA, no state or local regulation or other legal requirement can prohibit or have the effect of prohibiting the ability of any entity to provide any interstate or intrastate telecommunications service.

Further, Section 704 of the TCA imposes limitations on what local and state governments can do. Section 704 prohibits any state and local government action which unreasonably discriminates among personal wireless providers. Local governments must ensure that its wireless ordinance does not contain requirements in the form of regulatory terms or fees which may have the "effect" of prohibiting the placement, construction, or modification of personal wireless services.

Section 704 also preempts any local zoning regulation purporting to regulate the placement, construction and modification of personal wireless service facilities on the basis, either directly or indirectly, on the environmental effects of radio frequency emissions (RF) of such facilities, which otherwise comply with FCC standards in this regard. See, 47 U.S.C. 332(c)(7)(B)(iv) (1996). This means that local authorities may not regulate the siting or construction of personal wireless facilities based on RF standards that are more stringent than those promulgated by the FCC.

Section 704 mandates that local governments act upon personal wireless service facility siting applications to place, construct, or modify a facility within a reasonable time. 47 U.S.C.332(c)(7)(B)(ii). See FCC Shot Clock ruling setting forth "reasonable time" standards for applications deemed complete. Section 704 also mandates that the FCC provide technical support to local governments in order to encourage them to make property, rights-of-way, and easements under their jurisdiction available for the placement of new spectrum-based telecommunications services. This proceeding is currently at the comment stage.

For more information on the FCC's jurisdiction in this area, contact Steve Markendorff, Chief of the Broadband Branch, Commercial Wireless Division, Wireless Telecommunications Bureau, at (202) 418-0640 or e-mail "smarkend@fcc.gov".

Case File Number: PLN14036

Page 4

PROPERTY DESCRIPTION

The existing utility poles are located on the public right-of-way sidewalk reserve (unfinished) of Mountain Boulevard. The telecommunication facilities would be self-contained and unmanned and would be mounted to two separate poles, with the equipment cabinet's pole on the east side of the street (in a vegetated divide between 1244 and 1300 Mountain), and the 2 antennas mounted above the pole on the west side of Mountain. The subject site is located within a residential zone and surrounded by residential properties.

GENERAL PLAN ANALYSIS

The subject property is located within the Hillside Residential General Plan designation. The Hillside Residential land use classification is intended to create, maintain and enhance neighborhood residential areas that are characterized by detached, single unit structures on hillside lots. The proposed unmanned wireless telecommunication facility will not adversely affect or detract from the residential characteristics of the neighborhood along Mountain Boulevard.

ZONING ANALYSIS

The zoning for the subject property is RH-4, Hillside Residential Zone-4. The intent of the RH-4 zone is to create, maintain, and enhance areas for single-family dwellings on lots of 6,500 to 8,000 square feet and is typically appropriate in already developed areas of the Oakland Hills. Major Design Review is required for the addition of a Macro Telecommunication Facility mounted on existing utility poles since the project is located in a residential zone. Staff finds that the proposed application meets the City of Oakland Telecommunication regulations (see Findings for Approval).

ENVIRONMENTAL DETERMINATION

The California Environmental Quality Act (CEQA) Guidelines lists the projects that qualify as categorical exemptions from environmental review. The proposed project is categorically exempt from the environmental review requirements pursuant to Sec. 15301, minor alterations to an existing facility, Sec. 15303, construction of new small facilities, and 15183, projects consistent with the general plan or zoning.

KEY ISSUES AND IMPACTS

1. Design Review

The project is located along the public right-of-way of Mountain Boulevard. The proposed antenna and equipment cabinets will be painted to match the existing light pole and placed approximately 30' and 10' respectively above grade away from the line of sight associated with abutting residential properties. The equipment cabinet and antennas where located on separate poles to reduce the total overall massing on a single pole. The choice of the east side pole for the equipment cabinets was chosen because it offered the least obtrusive visual impacts for the west facing (view) windows on the upslope houses.

2. Project Site

Page 5

Section 17.128.110 of the City'of Oakland Telecommunication Regulations requires that wireless facilities shall generally be located on designated properties or facilities in the following order of preference:

- A. Co-located on an existing structure or facility with existing wireless antennas.
- B. City owned properties or other public or quasi-public facilities.
- C. Existing commercial or industrial structures in non-residential zones.
- D. Existing commercial or industrial structures in residential zones.
- E. Other non-residential uses in residential zones.
- F. Residential uses in non-residential zones.
- G. Residential uses in residential zones.
- *Facilities locating on an A, B or C ranked preference do not require a site alternatives analysis.

Since the proposed project involves the co-location of an unmanned wireless telecommunications facility on existing utility poles (one with an existing City street light), the proposed development meets the (B) City owned properties or other public or quasi-public facilities, therefore a site alternatives analysis is not required.

3. Project Design

Section 17.128.120 of the City of Oakland Telecommunications Regulations indicates that new wireless facilities shall generally be designed in the following order of preference:

- A. Building or structure mounted antennas completely concealed from view.
- B. Building or structure mounted antennas set back from roof edge, not visible from public right-of way.
- C. Building or structure mounted antennas below roof line (facade mount, pole mount) visible from public right-of-way, painted to match existing structure.
- D. Building or structure mounted antennas above roof line visible from public right of-way.
- E. Monopoles.
- F. Towers.
- * Facilities designed to meet an A or B ranked preference do not require site design alternatives analysis. Facilities designed to meet a C through F ranked preference, inclusive, must submit a site design alternatives analysis as part of the required application materials. This project is a proposed co-location establishing a new telecommunications facility.

The project best meets design criteria (A) and (E) since the panel antennas, though not screened, will be located in the least obtrusive location available. As proposed, the antenna and equipment cabinets have been co-located on existing utility poles at angles and levels that are (to the greatest extent possible) below the sight lines / the interior views of the nearest homes. While it is impossible to completely conceal from view pole mounted telecommunications appurtenances the considerable bulk of the equipment cabinets and the antenna mountings have been divided in to two locations (poles) rather than placed on one single pole. The placement of the equipment on the east side of the street is done in an attempt to screen some of its bulk by placing it within close proximity to existing trees and other vegetation which is not present on the west side of the street. The use of utility poles most closely resembles the creation of Monopoles. Collocating on existing poles is seen as a better option that establishing a wholly new utility pole in or on the public right of way. Finally all proposed antennas and equipment are to be painted to match the utility /light pole thus minimizing their impacts from the public view. Furthermore, to mitigate visual impacts the equipment and antenna will be mounted at least 10' above any pedestrian pathway.

4. Project Radio Frequency Emissions Standards

Section 17.128.130 of the City of Oakland Telecommunication Regulations require that the applicant submit the following verifications including requests for modifications to existing facilities:

- a. With the initial application, a RF emissions report, prepared by a licensed professional engineer or other expert, indicating that the proposed site will operate within the current acceptable thresholds as established by the Federal government or any such agency who may be subsequently authorized to establish such standards.
- b. Prior to commencement of construction, a RF emissions report indicating the baseline RF emissions condition at the proposed site.
- c. Prior to final building permit sign off, an RF emissions report indicating that the site is actually operating within the acceptable thresholds as established by the Federal government or any such agency who may be subsequently authorized to establish such standards.

A RF emissions report, prepared by EBI Consulting, (Attachment B) indicated that the proposed project meets the radio frequency (RF) emissions standards as required by the regulatory agency. The report states that the proposed project will comply with the prevailing standards for limiting public exposure to radio frequency energy and, therefore, will not cause a significant impact on the environment. Additionally, staff recommends that prior to the issuance of a final building permit, that the applicant submits certified RF emissions report stating that the facility is operating within acceptable thresholds established by the regulatory federal agency.

CONCLUSION

The proposed project meets all of the required findings for approval. Therefore, staff recommends approval of the project subject to the attached conditions.

RECOMMENDATIONS:

- 1. Affirm staff's environmental determination
- 2. Approve Major Design Review application PLN14036 subject to the attached findings and conditions of approval.

Prepared by:

Moe Hackett Planner II

Approved by:

Robert Merkamp

Development Planning Manager

Approved for forwarding to the

Page 7

City Planning Commission

Darin Ranelletti

Deputy Director of Department of Planning and Building

ATTACHMENTS:

A. Project Plans & Photo simulation

B. AT&T Mobility Radio Frequency Statement

Page 8

FINDINGS FOR APPROVAL

FINDINGS FOR APPROVAL:

This proposal meets all the required findings under Section 17.136.050.(B), of the Non-Residential Design Review criteria; all the required findings under Section 17.128.070(B), of the telecommunication facilities (Macro) Design Review criteria; and as set forth below and which are required to approve your application. Required findings are shown in **bold** type; reasons your proposal satisfies them are shown in normal type.

17.136.050(B) - NONRESIDENTIAL DESIGN REVIEW CRITERIA:

1. That the proposal will help achieve or maintain a group of facilities which are well related to one another and which, when taken together, will result in a well-composed design, with consideration given to site, landscape, bulk, height, arrangement, texture, materials, colors, and appurtenances; the relation of these factors to other facilities in the vicinity; and the relation of the proposal to the total setting as seen from key points in the surrounding area. Only elements of design which have some significant relationship to outside appearance shall be considered, except as otherwise provided in Section 17.136.060;

The proposal is to establish a macro Telecommunication facility consisting of two (2) antennas and associated equipment cabinets that would be mounted on two separate utility poles (one containing a city street light) on either side of Mountain Boulevard. The proposed antennas and equipment cabinet would be painted to match the existing pole to which they would be mounted. The equipment cabinets, and antennas are placed on their respective poles at heights and locations that are calculated to have the fewest visual impacts as seen from within the nearby houses primary view windows, as designed this proposal is consistent and well related to the surrounding area in scale, bulk, height, materials, and textures. Through the design and conditions of approval all proposed antennas and equipment will be paint to match the existing pole and poles in the surrounding area.

2. That the proposed design will be of a quality and character which harmonizes with, and serves to protect the value of, private and public investments in the area;

The proposal protects and preserves the surrounding neighborhood context by adding additional wireless telecommunication antennas to a residential area on two separate utility poles, and thus reducing the combined visual impacts were the devices combined on a single poles. The antennas will be located approximately 30' (center) above grade on a level area at the Street and will not have little visual impact on the adjacent neighborhood. The equipment cabinet (on the east side of the street) will be located approximately 11 feet above the ground and will reach a height of approximately 19 feet above the street.

3. That the proposed design conforms in all significant respects with the Oakland General Plan and with any applicable design review guidelines or criteria, district plan, or development control map which have been adopted by the Planning Commission or City Council.

The proposal conforms with the City of Oakland General Plan meeting specific General Plan policies (N2.2) and the Supplemental Report and Recommendations on Revisions to the Citywide

Page 9

Telecommunications Regulations. The proposal will conform to performance standards for noise set forth in Section 17.120.050 for decibels levels in residential areas for both day and nighttime use. The Project conforms to all macro-facility definitions set forth in Section 17.128.070 and meets all design review criteria to minimize all impacts throughout the neighborhood.

DESIGN REVIEW CRITERIA FOR MACRO FACILITIES (OMC SEC. 17.128.070(B)):

1. Antennas should be painted and/or textured to match the existing structure.

The antennas will be painted matte brown to match the color of the wooden pole, as conditioned.

2. Antennas mounted on architecturally significant structures or significant architectural detail of the building should be covered by appropriate casings which are manufactured to match existing architectural features found on the building.

The antennas will be attached to an existing wooden utility pole.

3. Where feasible, antennas can be placed directly above, below or incorporated with vertical design elements of a building to help in camouflaging.

The antennas will be mounted directly on top of an existing wooden utility pole.

4. Equipment shelters or cabinets shall be screened from the public view by using landscaping, or materials and colors consistent with surrounding backdrop or placed underground or inside existing facilities or behind screening fences.

As conditioned, equipment cabinets will be mounted to the pole in a singular shroud that is significantly smaller than typical ground mounted cabinets and shelters and the exterior will be painted matte brown to match the color of the wooden pole.

5. Equipment shelters or cabinets shall be consistent with the general character of the area.

As conditioned, equipment cabinets will be housed in a singular shroud attached to an existing structure (wooden utility pole) and painted to match its color.

6. For antennas attached to the roof, maintain a 1:1 ratio (example: ten feet high antenna requires ten feet setback from facade) for equipment setback; screen the antennas to match existing air conditioning units, stairs, or elevator towers; avoid placing roof mounted antennas in direct line with significant view corridors.

This finding is inapplicable; the proposal does not involve a roofed structure.

Page 10

7. That all reasonable means of reducing public access to the antennas and equipment has been made, including, but not limited to, placement in or on buildings or structures, fencing, anti climbing measures and anti-tampering devices.

Equipment will be pole mounted a minimum of 10' above grade of the street and, as conditioned, will be encased in a shroud; the antenna will be located at 30' (center) above the street.

Page 11

CONDITIONS OF APPROVAL

STANDARD CONDITIONS:

1. Approved Use

Ongoing

- a) The project shall be constructed and operated in accordance with the authorized use as described in the application materials, PLN14039, and the plans dated October 17, 2013 and submitted on March 6, 2014 and as amended by the following conditions. Any additional uses or facilities other than those approved with this permit, as described in the project description and the approved plans, will require a separate application and approval. Any deviation from the approved drawings, Conditions of Approval or use shall required prior written approval from the Director of City Planning or designee.
- b) This action by the City Planning Commission ("this Approval") includes the approvals set forth below. This Approval includes: the creation of two (2) antennas and associated equipment and cabinets (including one radio unit) on two existing Utility Poles in the public right of way of Mountain Boulevard. These macro telecommunication facilities will be located in the public right-of-way in front of 1244, 1265, and 1300 Mountain Boulevard(adjacent to APN: 048G-7418-023-01, 048G-7404-018-00, and 048G-7418-062-00), under Oakland Planning Code 17.128 and 17.136.

2. Effective Date, Expiration, Extensions and Extinguishment

Ongoing

Unless a different termination date is prescribed, this Approval shall expire two calendar years from the approval date, unless within such period all necessary permits for construction or alteration have been issued, or the authorized activities have commenced in the case of a permit not involving construction or alteration. Upon written request and payment of appropriate fees submitted no later than the expiration date of this permit, the Director of City Planning or designee may grant a one-year extension of this date, with additional extensions subject to approval by the approving body. Expiration of any necessary building permit for this project may invalidate this Approval if the said extension period has also expired.

3. Scope of This Approval; Major and Minor Changes

Ongoing

The project is approved pursuant to the **Oakland Planning Code Telecommunications Regulations** only. Minor changes to approved plans may be approved administratively by the Director of City Planning or designee. Major changes to the approved plans shall be reviewed by the Director of City Planning or designee to determine whether such changes require submittal and approval of a revision to the approved project by the approving body or a new, completely independent permit.

4. Conformance with other Requirements

Prior to issuance of a demolition, grading, P-job, or other construction related permit

a) The project applicant shall comply with all other applicable federal, state, regional and/or local codes, requirements, regulations, and guidelines, including but not limited to those imposed by

Page 12

the City's Building Services Division, the City's Fire Marshal, and the City's Public Works Agency.

b) The applicant shall submit approved building plans for project-specific needs related to fire protection to the Fire Services Division for review and approval, including, but not limited to automatic extinguishing systems, water supply improvements and hydrants, fire department access, and vegetation management for preventing fires and soil erosion.

5. <u>Conformance to Approved Plans; Modification of Conditions or Revocation</u> Ongoing

- a) Site shall be kept in a blight/nuisance-free condition. Any existing blight or nuisance shall be abated within 60-90 days of approval, unless an earlier date is specified elsewhere.
- b) The City of Oakland reserves the right at any time during construction to require certification by a licensed professional that the as-built project conforms to all applicable zoning requirements, including but not limited to approved maximum heights and minimum setbacks. Failure to construct the project in accordance with approved plans may result in remedial reconstruction, permit revocation, permit modification, stop work, permit suspension or other corrective action.
- c) Violation of any term, conditions or project description relating to the Approvals is unlawful, prohibited, and a violation of the Oakland Municipal Code. The City of Oakland reserves the right to initiate civil and/or criminal enforcement and/or abatement proceedings, or after notice and public hearing, to revoke the Approvals or alter these conditions if it is found that there is violation of any of the conditions or the provisions of the Planning Code or Municipal Code, or the project operates as or causes a public nuisance. This provision is not intended to, nor does it, limit in any manner whatsoever the ability of the City to take appropriate enforcement actions.

6. Signed Copy of the Conditions

With submittal of a demolition, grading, and building permit

A copy of the approval letter and conditions shall be signed by the property owner, notarized, and submitted with each set of permit plans to the appropriate City agency for this project.

7. Indemnification

Ongoing

- a) To the maximum extent permitted by law, the applicant shall defend (with counsel acceptable to the City), indemnify, and hold harmless the City of Oakland, the Oakland City Council, the City of Oakland Redevelopment Agency, the Oakland City Planning Commission and its respective agents, officers, and employees (hereafter collectively called City) from any liability, damages, claim, judgment, loss (direct or indirect)action, causes of action, or proceeding (including legal costs, attorneys' fees, expert witness or consultant fees, City Attorney or staff time, expenses or costs) (collectively called "Action") against the City to attack, set aside, void or annul, (1) an approval by the City relating to a development-related application or subdivision or (2) implementation of an approved development-related project. The City may elect, in its sole discretion, to participate in the defense of said Action and the applicant shall reimburse the City for its reasonable legal costs and attorneys' fees.
- b) Within ten (10) calendar days of the filing of any Action as specified in subsection A above, the applicant shall execute a Letter Agreement with the City, acceptable to the Office of the City Attorney, which memorializes the above obligations. These

Page 13

obligations and the Letter of Agreement shall survive termination, extinguishment or invalidation of the approval. Failure to timely execute the Letter Agreement does not relieve the applicant of any of the obligations contained in this condition or other requirements or conditions of approval that may be imposed by the City.

8. Compliance with Conditions of Approval

Ongoing

The project applicant shall be responsible for compliance with the recommendations in any submitted and approved technical report and all the Conditions of Approval set forth below at its sole cost and expense, and subject to review and approval of the City of Oakland.

9. Severability

Ongoing

Approval of the project would not have been granted but for the applicability and validity of each and every one of the specified conditions, and if any one or more of such conditions is found to be invalid by a court of competent jurisdiction this Approval would not have been granted without requiring other valid conditions consistent with achieving the same purpose and intent of such Approval.

10. Job Site Plans

Ongoing throughout demolition, grading, and/or construction

At least one (1) copy of the stamped approved plans, along with the Approval Letter and Conditions of Approval, shall be available for review at the job site at all times.

11. Operational Noise

Ongoing.

Noise levels from the activity, property, or any mechanical equipment on site shall comply with the performance standards of Section 17.120 of the Oakland Planning Code and Section 8.18 of the Oakland Municipal Code. If noise levels exceed these standards, the activity causing the noise shall be abated until appropriate noise reduction measures have been installed and compliance verified by the Planning and Zoning Division and Building Services.

12. Days/Hours of Construction Operation

Ongoing throughout demolition, grading, and/or construction

The project applicant shall require construction contractors to limit standard construction activities as follows:

- a) Construction activities are limited to between 7:00 AM and 7:00 PM Monday through Friday, except that pile driving and/or other extreme noise generating activities greater than 90 dBA shall be limited to between 8:00 a.m. and 4:00 p.m. Monday through Friday.
- b) Any construction activity proposed to occur outside of the standard hours of 7:00 am to 7:00 pm Monday through Friday for special activities (such as concrete pouring

which may require more continuous amounts of time) shall be evaluated on a case by case basis, with criteria including the proximity of residential uses and a consideration of resident's preferences for whether the activity is acceptable if the overall duration of construction is shortened and such construction activities shall only be allowed with the prior written authorization of the Building Services Division.

Page 14

- c) Construction activity shall not occur on Saturdays, with the following possible exceptions:
 - i. Prior to the building being enclosed, requests for Saturday construction for special activities (such as concrete pouring which may require more continuous amounts of time), shall be evaluated on a case by case basis, with criteria including the proximity of residential uses and a consideration of resident's preferences for whether the activity is acceptable if the overall duration of construction is shortened. Such construction activities shall only be allowed on Saturdays with the prior written authorization of the Building Services Division.
- ii. After the building is enclosed, requests for Saturday construction activities shall only be allowed on Saturdays with the prior written authorization of the Building Services Division, and only then within the interior of the building with the doors and windows closed.
- d) No extreme noise generating activities (greater than 90 dBA) shall be allowed on Saturdays, with no exceptions.
- e) No construction activity shall take place on Sundays or Federal holidays.
- f) Construction activities include but are not limited to: truck idling, moving equipment (including trucks, elevators, etc) or materials, deliveries, and construction meetings held on-site in a non-enclosed area.

PROJECT SPECIFIC CONDTIONS:

13. Emissions Report

Prior to a final inspection

The applicant shall provide an RF emissions report to the City of Oakland Zoning Division indicating that the site is actually operating within the acceptable thresholds as established by the Federal government or any such agency that may be subsequently authorized to establish such standards.

14. Architectural Detailing and Painting

Prior to the final building permit sign off

The applicant shall paint the light pole (monopole), all proposed antennas, and other related equipment attached brown to match the existing pole.

15. Underground Districts

Ongoing

Should the utility pole be voluntarily removed for purposes of district under grounding or otherwise, the telecommunications facility can only be re-established by applying for and receiving approval of a new application to the Oakland Planning and Zoning Division as required by the regulations.

Page 15

11. Approved Use

Ongoing

- a) The project shall be constructed and operated in accordance with the authorized use as described in the application materials, Staff Report, and the plans dated October 17, 2013 and submitted on March 6, 2014, and as amended by the following conditions. Any additional uses or facilities other than those approved with this permit, as described in the project description and the approved plans, will require a separate application and approval. Any deviation from the approved drawings, Conditions of Approval or use shall required prior written approval from the Director of City Planning or designee.
- b) This action by the City Planning Commission ("this Approval") includes the approvals set forth below. This Approval includes: the creation of two (2) antennas and associated equipment and cabinets (including one radio unit) on two existing Utility Poles in the public right of way of Mountain Boulevard. These macro telecommunication facilities will be located in the public right-of-way in front of 1244, 1265, and 1300 Mountain Boulevard (adjacent to APN: 048G-7418-023-01, 048G-7404-018-00, and 048G-7418-062-00), under Oakland Planning Code 17.128 and 17.136

12. <u>Effective Date, Expiration, Extensions and Extinguishment</u> Ongoing

Unless a different termination date is prescribed, this Approval shall expire two calendar years from the approval date, unless within such period all necessary permits for construction or alteration have been issued, or the authorized activities have commenced in the case of a permit not involving construction or alteration. Upon written request and payment of appropriate fees submitted no later than the expiration date of this permit, the Director of City Planning or designee may grant a one-year extension of this date, with additional extensions subject to approval by the approving body. Expiration of any necessary building permit for this project may invalidate this Approval if the said extension period has also expired.

13. Scope of This Approval; Major and Minor Changes Ongoing

The project is approved pursuant to the Planning Code only. Minor changes to approved plans may be approved administratively by the Director of City Planning or designee. Major changes to the approved plans shall be reviewed by the Director of City Planning or designee to determine whether such changes require submittal and approval of a revision to the approved project by the approving body or a new, completely independent permit.

14. Conformance with other Requirements

Prior to issuance of a demolition, grading, P-job, or other construction related permit

c) The project applicant shall comply with all other applicable federal, state, regional and/or local laws/codes, requirements, regulations, and guidelines, including but not limited to those imposed by the City's Building Services Division, the City's Fire Marshal, and the City's Public Works Agency. Compliance with other applicable

Page 16

requirements may require changes to the approved use and/or plans. These changes shall be processed in accordance with the procedures contained in Condition of Approval 3.

d) The applicant shall submit approved building plans for project-specific needs related to fire protection to the Fire Services Division for review and approval, including, but not limited to automatic extinguishing systems, water supply improvements and hydrants, fire department access, and vegetation management for preventing fires and soil erosion.

15. <u>Conformance to Approved Plans; Modification of Conditions or Revocation</u> *Ongoing*

- a) Site shall be kept in a blight/nuisance-free condition. Any existing blight or nuisance shall be abated within 60-90 days of approval, unless an earlier date is specified elsewhere.
- b) The City of Oakland reserves the right at any time during construction to require certification by a licensed professional that the as-built project conforms to all applicable zoning requirements, including but not limited to approved maximum heights and minimum setbacks. Failure to construct the project in accordance with approved plans may result in remedial reconstruction, permit revocation, permit modification, stop work, permit suspension or other corrective action.
- c) Violation of any term, Conditions or project description relating to the Approvals is unlawful, prohibited, and a violation of the Oakland Municipal Code. The City of Oakland reserves the right to initiate civil and/or criminal enforcement and/or abatement proceedings, or after notice and public hearing, to revoke the Approvals or alter these Conditions if it is found that there is violation of any of the Conditions or the provisions of the Planning Code or Municipal Code, or the project operates as or causes a public nuisance. This provision is not intended to, nor does it, limit in any manner whatsoever the ability of the City to take appropriate enforcement actions. The project applicant shall be responsible for paying fees in accordance with the City's Master Fee Schedule for inspections conducted by the City or a City-designated third-party to investigate alleged violations of the Conditions of Approval.

16. Signed Copy of the Conditions

With submittal of a demolition, grading, and building permit

A copy of the approval letter and Conditions shall be signed by the property owner, notarized, and submitted with each set of permit plans to the appropriate City agency for this project.

17. Indemnification

Ongoing

a) To the maximum extent permitted by law, the applicant shall defend (with counsel acceptable to the City), indemnify, and hold harmless the City of Oakland, the Oakland

Page 17

City Council, the City of Oakland Redevelopment Agency, the Oakland City Planning Commission and its respective agents, officers, and employees (hereafter collectively called City) from any liability, damages, claim, judgment, loss (direct or indirect)action, causes of action, or proceeding (including legal costs, attorneys' fees, expert witness or consultant fees, City Attorney or staff time, expenses or costs) (collectively called "Action") against the City to attack, set aside, void or annul, (1) an approval by the City relating to a development-related application or subdivision or (2) implementation of an approved development-related project. The City may elect, in its sole discretion, to participate in the defense of said Action and the applicant shall reimburse the City for its reasonable legal costs and attorneys' fees.

b) Within ten (10) calendar days of the filing of any Action as specified in subsection A above, the applicant shall execute a Letter Agreement with the City, acceptable to the Office of the City Attorney, which memorializes the above obligations. These obligations and the Letter of Agreement shall survive termination, extinguishment or invalidation of the approval. Failure to timely execute the Letter Agreement does not relieve the applicant of any of the obligations contained in this condition or other requirements or conditions of approval that may be imposed by the City.

18. Compliance with Conditions of Approval

Ongoing

The project applicant shall be responsible for compliance with the recommendations in any submitted and approved technical report and all the Conditions of Approval set forth below at its sole cost and expense, and subject to review and approval of the City of Oakland.

19. Severability

Ongoing

Approval of the project would not have been granted but for the applicability and validity of each and every one of the specified conditions, and if one or more of such conditions is found to be invalid by a court of competent jurisdiction this Approval would not have been granted without requiring other valid conditions consistent with achieving the same purpose and intent of such Approval.

20. Job Site Plans

Ongoing throughout demolition, grading, and/or construction

At least one (1) copy of the stamped approved plans, along with the Approval Letter and Conditions of Approval, shall be available for review at the job site at all times.

21. Special Inspector/Inspections, Independent Technical Review, Project Coordination and Management

Prior to issuance of a demolition, grading, and/or construction permit (if applicable)

The project applicant may be required to pay for on-call third-party special inspector(s)/inspections as needed during the times of extensive or specialized plancheck review or construction. The project applicant may also be required to cover the full costs

Page 18

of independent technical review and other types of peer review, monitoring and inspection, including without limitation, third party plan check fees, including inspections of violations of Conditions of Approval. The project applicant shall establish a deposit with the Building Services Division, as directed by the Building Official, Director of City Planning or designee.

PROJECT SPECIFIC CONDTIONS:

22. Emissions Report

Prior to a final inspection

The applicant shall provide an RF emissions report to the City of Oakland Zoning Division indicating that the site is actually operating within the acceptable thresholds as established by the Federal government or any such agency that may be subsequently authorized to establish such standards.

23. Architectural Detailing and Painting

Prior to the final building permit sign off

The applicant shall paint the light pole (monopole), all proposed antennas, and other related equipment attached brown to match the existing pole.

24. <u>Underground Districts</u>

Ongoing

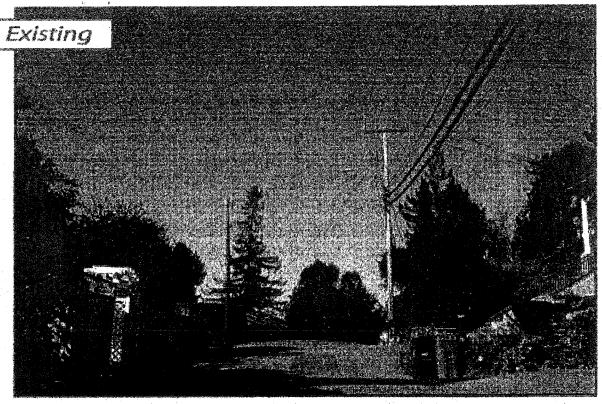
Should the utility pole be voluntarily removed for purposes of district under grounding or otherwise, the telecommunications facility can only be re-established by applying for and receiving approval of a new application to the Oakland Planning and Zoning Division as required by the regulations

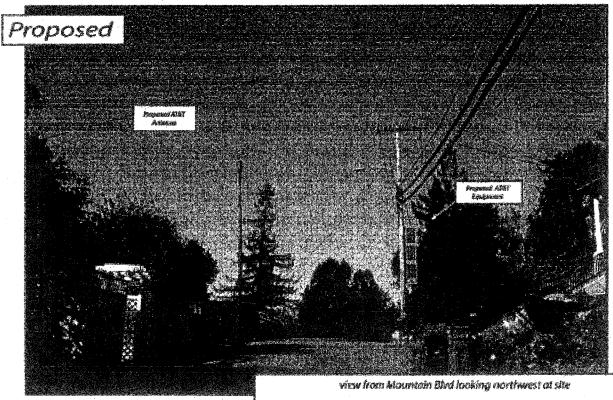
APPROVED I	BY:			
City Planning	Commission:		(date)	(vote)
City Council:_		(date)		(vote)

Applicant and/or Contractor Statement

I have read and accept responsibility for the Conditions of Approval, as approved by Planning Commission action on . I agree to abide by and conform to these conditions, as well as to all provisions of the Oakland Zoning Code and Municipal Code pertaining to the project.

Oakland City Planning Commission			Se	ptember 17, 2014
Case File Number: PLN14036				Page 19
		*		·
Signature of Owner/Applicant:				(date)
Signature of Contractor				(date)





ATTACHMENT A

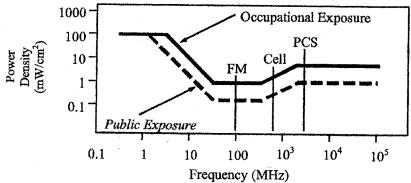
1265 Mountain Blvd, Cakland , CA Ookhilis AT&T South Network Nade 0466

FCC Radio Frequency Protection Guide

The U.S. Congress required (1996 Telecom Act) the Federal Communications Commission ("FCC") to adopt a nationwide human exposure standard to ensure that its licensees do not, cumulatively, have a significant impact on the environment. The FCC adopted the limits from Report No. 86, "Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields," published in 1986 by the Congressionally chartered National Council on Radiation Protection and Measurements ("NCRP"). Separate limits apply for occupational and public exposure conditions, with the latter limits generally five times more restrictive. The more recent standard, developed by the Institute of Electrical and Electronics Engineers and approved as American National Standard ANSI/IEEE C95.1-2006, "Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz," includes similar limits. These limits apply for continuous exposures from all sources and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health.

As shown in the table and chart below, separate limits apply for occupational and public exposure conditions, with the latter limits (in italics and/or dashed) up to five times more restrictive:

Frequency	Electro	magnetic F	ields (f is fi	requency of	emission in	MHz)	
Applicable Range (MHz)	Electric Field Strength (V/m)		Magnetic Field Strength (A/m)		Equivalent Far-Field Power Density (mW/cm ²)		
0.3 - 1.34	614	614	1.63	1.63	100	100	
1.34 - 3.0	614	823.8/f	1.63	2.19/f	100	180/f²	
3.0 - 30	1842/f	823.8/f	4.89/f	2.19/f	900/ f ²	180/ f²	
30 - 300	61.4	27.5	0.163	0.0729	1.0	0.2	
300 - 1,500	3.54 √ f	1.59√f	$\sqrt{t}/106$	√r/238	f/300	f/1500	
1,500 - 100,000	137	61.4	0.364	0.163	5.0	1,0	



Higher levels are allowed for short periods of time, such that total exposure levels averaged over six or thirty minutes, for occupational or public settings, respectively, do not exceed the limits, and higher levels also are allowed for exposures to small areas, such that the spatially averaged levels do not exceed the limits. However, neither of these allowances is incorporated in the conservative calculation formulas in the FCC Office of Engineering and Technology Bulletin No. 65 (August 1997) for projecting field levels. Hammett & Edison has built those formulas into a proprietary program that calculates, at each location on an arbitrary rectangular grid, the total expected power density from any number of individual radio sources. The program allows for the description of buildings and uneven terrain, if required to obtain more accurate projections.



HAMMETT & EDISON, INC.

CONSULTING ENGINEERS

SAN FRANCISCO

FCC Guidelines Figure 1



PROPRIETARY INFORMATION

at&t

SOUTH NETWORK
SOUTH NETWORK
NODE 0468
SAKANDER 128

10/17/13

ZONING

OAKHILLS AT&T SOUTH NETWORK OAKS-046B (PROW) 1265 MOUNTAIN BLVD, OAKLAND, CA 94611

	AO (0/17/2) SPUT POLE COMPG 1 AD 72/14/72 TA TA COSCEMPTON (62/	Continue of the continue of th	SEAL Of APPROVAL		TITLE SHEET	PROJECT INFORMATION	SHEET NUMBER:
Mortalanage Toglinda	TREADMINIST OFFICE A PORTION OF A DISTRIBUTED AFTERNA SYSTEM (UKS) TREADMINISTORY REPORTION OF A DISTRIBUTED AFTERNA SYSTEM (UKS) TREADMINISTORY REPORTION OF A DISTRIBUTED AFTERNA SHOWER AND OFFICE AND ADDRESS OF SHOWER AND ADDRESS OF THE CALFORNIA TO ADDRESS OF THE CALFORNIA TO ADDRESS OF THE WASTOLATION OF WAY OF 22.735 YILOSED YRESS FAMEL ANTENNAS, ONE (1) THE WAY COMPONENT OFFI THE INSTRUCTION AFT. THE WAY COMPONENT OF THE INSTRUCTION AFT. THE WAY COMPONENT OF THE INSTRUCTION AFT. THE WAY COMPONENT ASSOCIATED ELECTRICAL COMPONENTS, AND UNITARY POLES. UNITARY POLES.	T1 INTER SECT & PROJECT INFORMERS T2 GENERAL INTER AND SCHOOLS A1 STIFF CAM. A2 UTTIF ROE LENVERS / RISCH ISTALS (COUPLE) A3 UTTIF ROE LENVERS / RISCH ISTALS (COUPLE) S1 PARTS & RF SACTY PROTOCOLS S1 PARTS & RF SACTY PROTOCOLS S1 PARTS & RF SACTY PROTOCOLS	THE G CONSIGNATION HANGEN ROMERONS THE ROME WAYS	2	MARCHEL DRAWGE MUNICHAL ASTRONOMY STATES AND ASTRONOMY STATES AND ASTRONOMY STATES CALL LC. ASTR	HUNE: (314) 405-0629	WA WELLES PCS, ILC MITTHEW PRECONDS. SHEED MAN ALLES WAS ENDED TO THE STATE OF THE WASHE SHEED WAS ALLES WEST FOR THE ALLES WES
VICINITY MAP	any uic	DRIVING DIRECTIONS	The 4,430 ECORODO DR, PEDGARDO, CA 90282-3059 TD 12556 ACMARDO DR, PEDGARDO, CA 90282-3059 TD 12556 ACMARDO DR, PEDGARDO, CA 90282-3059 TO 100 THE PROPERTY OF		SIGNATURE BLOCK #PROAD B: NIBES DATE	MANGEN, ATTACK TO MANGER	CONSTRUCTOR MANGER PROCET MANAGER PROCET MANAGER MANAG
LEGEND & SYMBOLS	CONTRAME REPORTEY/LOSE UNE REPORTED COMMENT REPORTED COMM	4. A LAMONIN 119 11078 PRELIMENTS AND ARRESTS OF CONTROL OF CONTRO	March Marc	CODE COMPLIANCE	ALL WORK AND JANTERUS SAULI, RF FESCHOADS AND INSCIPLING AN ACCORDANCE WITH THE CORPORATE PRINCE AND ACCORDANCE WITH THE CORPORATE PRINCE AND ACCORDANCE WITH THE PRINCE AND ACCORDANCE WI	WORK NOT COMPOSANT TO THESE COOKS. 1. CHOTORN BELIEVE CONF. SEC. 2010. C. CHITCHEN RECOVERED CONF. CONF. 2010.	FOR THE STATE OF T

10/17/13

1. Havenimi hetele setter at 15 d'in comparait eux rechards à de meis rochmendra Nerren ne gener beteg a "Yspan to cosmet" mei, n'i well, for voir de meit eux maist, dat, progradoùs sénaz alde, dal tres 1-abs-277-frag dag mas getibre tre de, COMMENTER SHALL REPORTED TO THE INT THE AND HOLSHING OF ALL CORNER MATTERS THAT PURSES THE PRINCIPLE WISHOUT UNE AND MOST MANDER A FLAMBLE VERTICAL COLOMINE.

e. T. ant dissing hardere, de landsing erelate on the approx in and is galacid de relatio and de deservation of constation, if shall be repaired and/or replacid as said fix the approxi-S. CONTRETAE SHULL RETAINED ON RETHING ALL TRAFFE SCAM, LODRY, COURSE, AND LINE STREME, VARIAGE CONSTRUCTOR.

6. THIS MONET WILL BE INSPETTED BY EACHERING AND PICLE EMEMORIAL BASIDAY.

L. COMPACINE SHALL MEDIDINE M CROSM CAMPA, PAZON DARNE, THE PRODES CONSECTION CAPATES, THE PROCESH SHALL MED THE PAYLOGES MEMBERGES OF THE STATE WITH SECURED CENTRAL Inst. Daliwerns Swil, laws Editobart wildows and Roberton to Harn Rice Databasch.
 Harr Day Commission and Residence Williams and A power to Commission and Report Days. 7. SUPPORTES OR ETHERS SHIEL BY LABOUR CHEMIT

L. ANY REBORD OR WANNED STREME, AND MARRIES DIMER. REPLAZED IN 1900 AS MILICURENS. SHELLINGS MILI AT REMAINING STREET, DECORE.



Call before you dig 811 / 1-800-227-2600 www.usanoffl.org

GENERAL NOTES

ALL BOOK SHILL CONFORM TO THE LATEST ENTIRES OF COSS, TAS AND THE STANDARD SPECIFICATIONS FIRST AND WORSE CONSTRUCTORY AS ADDRESS AS A LONG BOOK OF STANDARD PROSECULAR FAMOR CONSTRUCTORY. NE COCTOCE AND LOCATION OF VIRICES AND UNDER AND STATES AS STATES AND ANY TOTAL PARTY. THE COCTOCE AND LOCATION OF COLOR AND LOCATION OF COLOR AND CONTROL AND COLOR A PRING TO THE MELDHANG OF AN INDICIPATION AND THROUGHDUST BIK COLORS OF CONCRECTION MITNY DIGITALISMS OF ALL THAT THE THAT THE THROUGHDUST SHEET AND THE THROUGHDUST SHEET AND THE THROUGHDUST SHEET.

s. Del compreden simil, motive hat cen, count do some dependen representation, at loads for designer same of may requirent their production.

). HE HANKUN COMY FOR ALL CONCURS PLACED WINDOWS SUID, IF NO NOTICE TO HE PAISED. PROF. AT ALL PLACE. 6. THE CITY, COLUMN OF STATE PARL SPITISM THE ESPECIAL PEODD OF THE POSMIT TOR THE CHARACTER POSMET.

B. All AC AND/DE COACHEE PANSAGAS SHAL BE REPLACED IN THE WHICKEN OF THE CITY, COUNTY OR SAIR LICENSESS. $L_{\rm c}$ decontrol yay, is an index and dates are execut counter engines are received at the definer of the correct objects.

11. Ne companíor mel el espansos firo ne matersas de al aparaje promi pade fairos alva-men de tendro dustro pasamel pros colore induceradas ané utros), he civi, como do Saje e algo dobbo hen ne bodomo dabor nacionas y al anguel de suproponio for da Dombrejar policie. IG. ALL SIGNER, PLANTS OR HINDS BAG HAK BOYN GALLLOOD ON DISTINION DIABOR THE CITIEST OF THE WORLK, SHALL BY KINDARDS AND AND RECEIVED SO AS AN RECEIVED THE WORLD SET TO BE DIABORAL CONDING.

1. WATER, FORESARE, COMMENTS AND GROWN THOSE OF SUBSTITUTION ARE THOSE SPECIATION TO WE WERE A SPECIATION THE ADMINISTRY AND SPECIAL OF THE ASSESSMENT OF TH THE CORRESPONS SHALL YER? THE LOCATION OF ALL DECIMES IN INCLINES IN INCLINES. SOMEY LOCATIONS & RESPONSES TO MARKALL LOCK OWN HOMEN HIS HERROWILK, HOWEN TO COMMENCE CONTINUED TO THE TABLE OF THE PROPERTY O

 Chroncide Saml and Develope Develope and incredices from France Samport, Medo Federation to Polab Borden vi flanc F Révent & Nelson et all for the Verified of Verified Borden of IS, THE LIGITARYS OF ALL TOSKIC WHITES STONE OF HEXT PLAN AS TIME EXPINE RETURNS AND MEMORPHORIST, THE TOSKIC STORAGE WITH THE MESS AS SECONDARY SCORE, AND WESSELDS, AND WESSELDS, FROM O CORRESSION A TOSKIC LIGHTON AS DESIRED THE WESSELDS THE WESSELD AND WESSELD FROM AN OFFICE OF THE LIGHTON AS DESIRED THE WESSELD THE WESSELD SAND BE WANTED TO WAS DESIRED TO WAS DESIRED.

. All Roddolffield of the Cats, Cooper, and Sulf. Targes willy Expolately, and left expression for growth of configuration of the February Schools (Australian Schools). The Property of Sulfield with Prolutive Americans and Josephy, with deutifield Roddolf, Royale, Royale, found, and year, and percy, SAPORKT CROSSON/SCOROCK CONTOX, PROX TO COUPLITOR OF FINE GAPRANIAGITS, STULL OF POSTOX THE CORRESPOND OF CALADED PERSON AS INSTANTO POLOM:

FIRST MUTTS LOCATION AS SUBJECT, ATTACKED THE OR SUBJECT, THE CONSTRUCTION STATES OF THE CONSTRUCTION OF T . The strem early meds, modes a grade the set decay argently specifical of dest as necessors of others.

W. ORBINO WHELES O'S LECTURE OF STATE O

10/17/13 1865 MOUNTAIN BLYD OAKLAND, CA 94611

IRRENT ISSUE DATE:

ZONING HDESCRIPTION:

at&t

. The concrusion are divinity formers shall be responsed for clause of self had has divinition solvens, has been essent in the substitution actions. s, the commence of galato fisch sholl cisty and wakinh all shoot me states Figs each subpay.

THE COMMENCES SAME ROUDING SICE AND RESIDENATION EACH MALDS SAMPALE

. The compactor symplection all december toward courts to worder to be assembled by the compactor december of the compactor of the compactor december of the compactor december of the compactor of the Tribergy and strongs the Description from Safel E. Hard America; at all their safely in The Triberg of the Constructions is all the Stockhold to see at demonstra Locations to Lake the Construction of "Safelyan" ranks seek and is safely.

PIN COMPINION SHILL METAL ADMINANT ENDERLYSSON, EDHIND, MOGREZ AS ANY BE RECHED. F THE RECOEM DAVID DAY TO MACHINATED CHRISTO DYSDIDON OF UNIVERSION EXCUMENANCES, RICH HAT WELL, SWART STATE OF THE STA g. The contractor small as actions all am same, that a pressure manager or proper made. Means onto attach made personal broths capies a manager compiter. 1). AL DESCONFITABOR CLARRO, MOUNTER PROMEDO POR TIL MPROPED CRADAC PLAR SMET MONTRODRED PROPER AL BENEVOLYBRIGHT DORRO, FOR HILDER CHARRONS SPALL BE UDRE TO THE MONTRODRED PROPERTY OF THE PROMEDIA SPACE OF THE PROPERTY OF

A. THE CONTROLING SHALL ARRANGE FOR MEDICAL ACTIONS AND SHE CONTROL FOR TO APIC, ZOTO FOR THE THE WAY CONTROL OF A PARTIES PRESENT DESCRIPT MERCHAL SHEATHWAY OF THE WAY AMAZIFYCHALLOWS HEN THE RESENT DESCRIPT TO EVALUATE THE ACTIONARY OF THE STORMARY AND THE WAY THE WAY SHARL THE ACTIONARY WAS AND AND THE PARTIES. THE CHATRACTER SAME DRIFT DAME, BYTLEME CLEARED, AND CHARBOE, FOR THE JAESS FOR WASH CHARACTER OF MAJERY FOSSEN DAY FROMEE ENDERNYZELINGER CHARACTER, HAGASINGS. 12. COROCO APLAS, ARCHAD DE PROJECT PROJECTIR AUST ORGAN ARRY TROM THE MAZE OF THE SLIDER A. HE CONCLUSION OF SIGN ROSPING DRI.)). All readonnly profitting enweck storm sakel 60; in place of the out of the hybridian day. In the sakes of the sakes of

ACI 10/17/13 SPLIT POLE CONFIG

DESCRIPTION

82

ACI 12/14/12 St. Davie

SCALE 2

CONTROL POST WHERE STREET, STR 5711 Research Drive Conton, MI 48188 ACI NUMBER

3030 Warnarwille Rd. Suite 340 Liste, R. 60532 www.cxtenel.com EAL OF APPROVAL:

Ķ

80.73 7 7 F

ANTENNA & CABLE SCHEDULE

WIND LOADING INFORMATION

MATE / WOTEL

AMARK æ

39.02 SO. FT.

HATERON/WINED ARK AREA

SELECT VCM

		**	
	U. 	11	
	-		
	i .		

PARTY OF TELS WENT FART STREETS FROM TO CRECISES, CAR CHEMISTREETS OF CAREFORDING 50 25 A 20 TH 37 58-6/10-0 0-0/2-0 14.82 SD. FT. N SPROUD 192 SO. FT. IN SHROUD TOP CANCE STUPPEN SPECE THE TOP DITOU CRATE 705 DEC. 200 1. (20) No Profes Record (19) 3-west STRACE.

1. (20) No Profes Record (19) 3-west STRACE on on-uses 1. (20) No Profes Record (19) 3-west STRACE (

2. FOR PRICES BUS EXCENTED.
2. FOR PRICES BUS EXCENTED.
3. FOR THE CONTROL TO SECURITY BUS SECURITY BUS TO SECURITY BUS SECURIT

STABLAGO, TECHCIONO, MOTES

CHOUND TISTER AT 5 ONG OR LOSS.

FLEAT AND, OWN WITH SELV ORDER.

FLEATER AND WITH SELV ORDER.

FLEATER TOWN TO AND AT EACH FIND

FLEATER ST FINN FORE.

FLEATER ST FINN FORE.

STANDARD CONDUST, NOTES:

GENERAL NOTES AND SCHEDULES EET NUMBER: SCALE

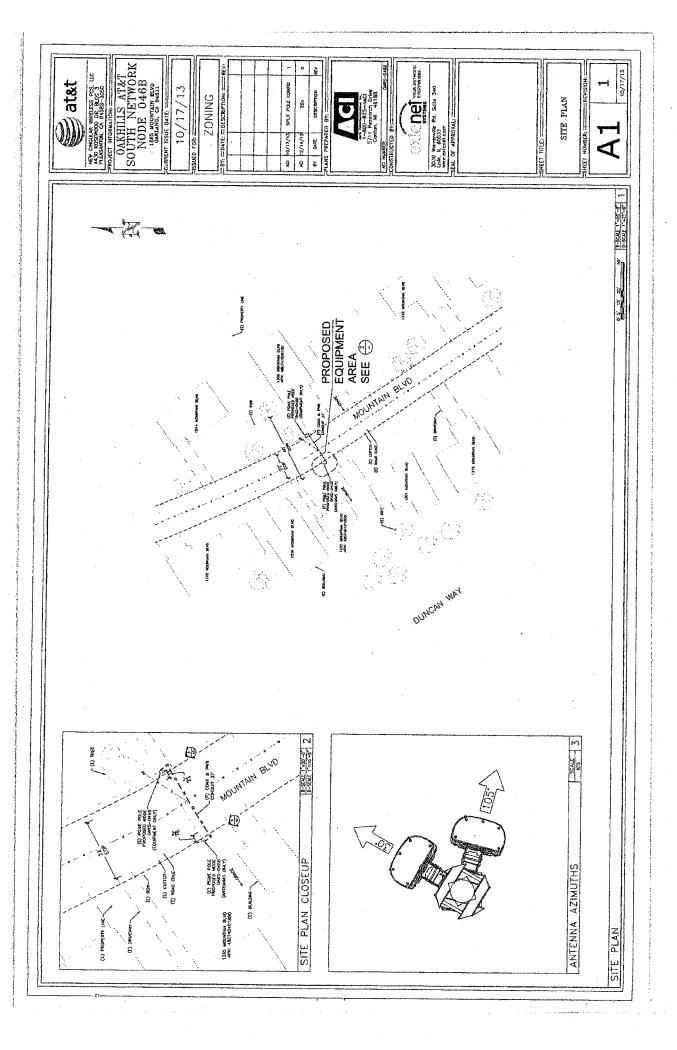
10/17/13

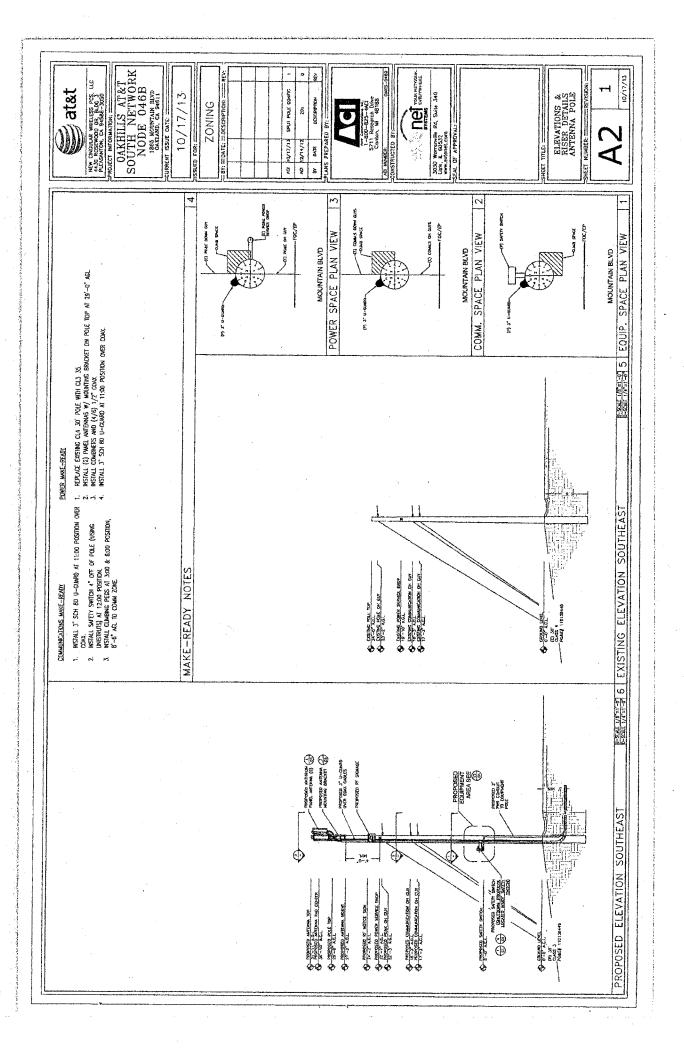
RO≪

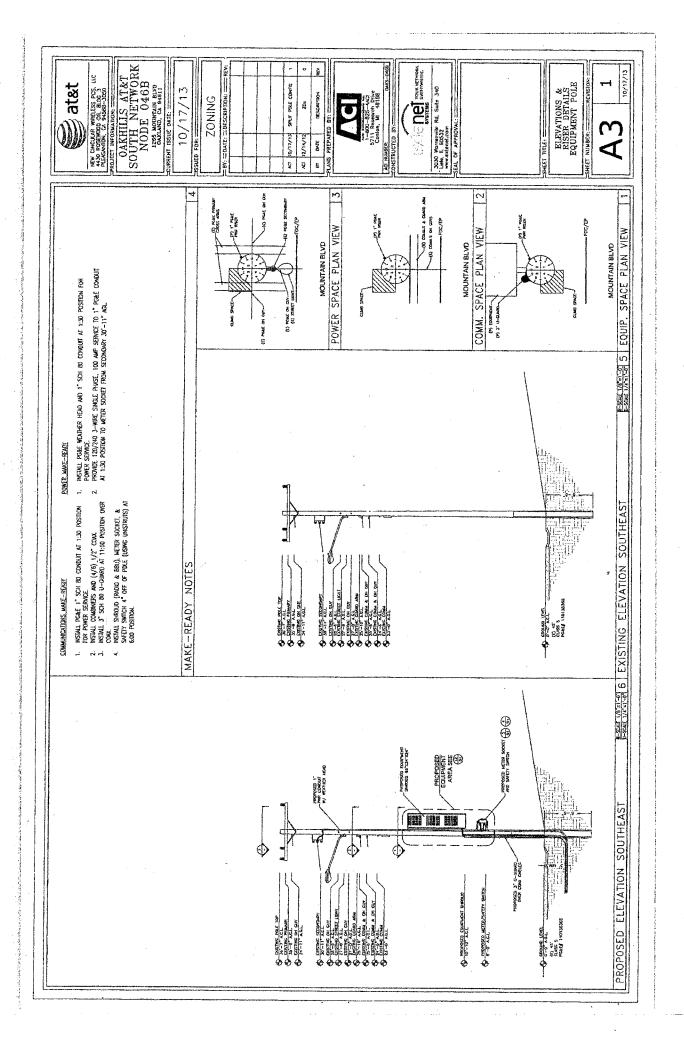
** Market of Montal Design DESIGNED CONSTITUTION OF MARKET OF THE COMMERCENCE CONSTITUTION OF THE COMMERCENCE CONSTITUTION OF THE COMMERCENCE OF T

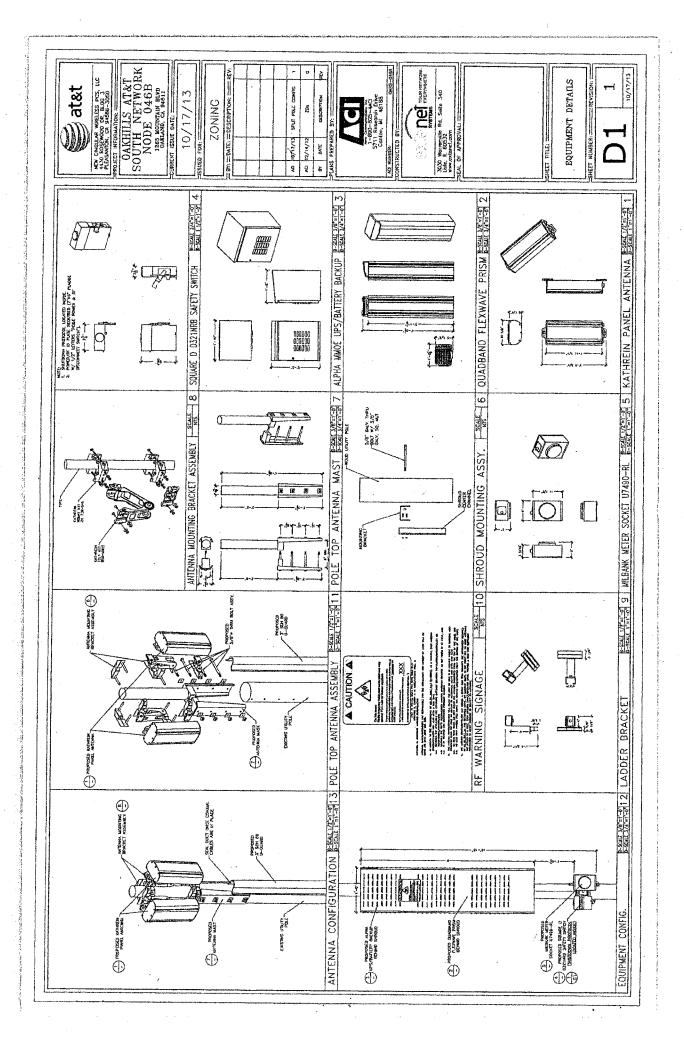
CONSTRUCTION GENERAL NOTES

| SOUTH | 3 | LOADING AND ANTENNA CABLE SCHEDULES









SHUTDOWN PROTOCOL 7"X9" LAMINATED CARD CARDSTOCK



AT&T oDAS Shutdown Procedure

PROCEDURE TO DE-ENERGIZE RADIO FREQUENCY (RF) SIGNAL EMERGENCY WORK REQUIRING RF SIGNAL SHUTDOWN

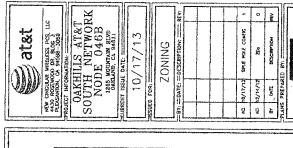
- (4) PG&E personnel SHALL contact AT&T Mobility Switch Center to notify them of an emergency shutdown 800-638-2822. Dial option 9 for cell site "Related" emergency's then option 1. Provide the following information when calling or leave a voicemail:

 - (1) Identify yourself and give callback phone number.
 (2) Site number and if applicable site name (located on the shutdown box)
 (3) Site address and location
 (4) Nature of emergency and site condition

(B) Pull Disconnect Handle down to the Open or "OFF" Position. The RF signal will shut down within a few seconds. A visual inspection of the interior blade will confirm that both incoming AC Lead and Battery Backup are disconnected.

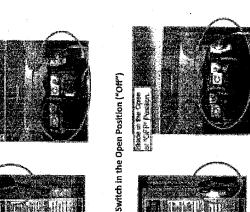
(C) Notify AT&T (New Cingular) Switch Center when the emergency work is completed.

See reverse side to view photo of the "on" and "off" position.



Switch in the Closed Position ("ON")

atet atet





NOTE BURNINGHE

3030 Worsewille Rd, Suite 340 Liste, I. 60532 www.extenel.com

10/17/13 ICET NUMBER: REVISION POWER & RF SAFETY PROTOCOLS

EET TITLE:

SHUTDOWN PROTOCOL

FRONT

BACK

RFR.CALC[™] Calculation Methodology

Assessment by Calculation of Compliance with FCC Exposure Guidelines

The U.S. Congress required (1996 Telecom Act) the Federal Communications Commission ("FCC") to adopt a nationwide human exposure standard to ensure that its licensees do not, cumulatively, have a significant impact on the environment. The maximum permissible exposure limits adopted by the FCC (see Figure 1) apply for continuous exposures from all sources and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health. Higher levels are allowed for short periods of time, such that total exposure levels averaged over six or thirty minutes, for occupational or public settings, respectively, do not exceed the limits.

Near Field.

Prediction methods have been developed for the near field zone of panel (directional) and whip (omnidirectional) antennas, typical at wireless telecommunications base stations, as well as dish (aperture) antennas, typically used for microwave links. The antenna patterns are not fully formed in the near field at these antennas, and the FCC Office of Engineering and Technology Bulletin No. 65 (August 1997) gives suitable formulas for calculating power density within such zones.

For a panel or whip antenna, power density $S = \frac{180}{\theta_{BW}} \times \frac{0.1 \times P_{net}}{\pi \times D \times h}$, in mW/cm²,

and for an aperture antenna, maximum power density $S_{max} = \frac{0.1 \times 16 \times \eta \times P_{net}}{\pi \times h^2}$, in mW/cm²,

where θ_{BW} = half-power beamwidth of the antenna, in degrees, and

Pnet = net power input to the antenna, in watts,

D = distance from antenna, in meters,

h = aperture height of the antenna, in meters, and

 η = aperture efficiency (unitless, typically 0.5-0.8).

The factor of 0.1 in the numerators converts to the desired units of power density.

Far Field.

OET-65 gives this formula for calculating power density in the far field of an individual RF source:

power density
$$S = \frac{2.56 \times 1.64 \times 100 \times RFF^2 \times ERP}{4 \times \pi \times D^2}$$
, in mW/cm²,

where ERP = total ERP (all polarizations), in kilowatts,

RFF = relative field factor at the direction to the actual point of calculation, and

D = distance from the center of radiation to the point of calculation, in meters.

The factor of 2.56 accounts for the increase in power density due to ground reflection, assuming a reflection coefficient of 1.6 ($1.6 \times 1.6 = 2.56$). The factor of 1.64 is the gain of a half-wave dipole relative to an isotropic radiator. The factor of 100 in the numerator converts to the desired units of power density. This formula has been built into a proprietary program that calculates, at each location on an arbitrary rectangular grid, the total expected power density from any number of individual radiation sources. The program also allows for the description of uneven terrain in the vicinity, to obtain more accurate projections.



AT&T Mobility • 32 Proposed Distributed Antenna System Nodes Oakland Hills • Oakland, California

Node #	Approximate Address		ntenna entations	Antenna Heigh	
035B	Grizzly Peak Boulevard and Golf Course Drive	116°T	321°T	Above Ground 42 ft	
03A6	2501 Grizzly Peak Boulevard	65°Т		35	
037B	7541 Claremont Avenue	54°T		44	
039A	8071 Claremont Avenue	36°T		44 48	
041A	Grizzly Peak Boulevard and Skyline Boulevard	149°T			
042A	0010 Pine Needle Drive	73°T	263 T 344°T	50	
046B	1265 Mountain Boulevard	30°T	105°T	45	
047A	5925 Sherwood Drive	13°T	285°T	31	
048A	Skyline Boulevard and Elverton Drive	153°T		34	
049A	1732 Indian Way	24°T	325°T	54	
050A	5612 Merriewood Drive		306°T	45	
051B	5658 Grisborne Avenue	46°T 87°T	110°T	45	
052B	5826 Mendoza Drive		355°T	45	
053B	6133 Snake Road	61°T	121°T	45	
054C	2040 Tampa Avenue	43°T	119°T	45	
055C	2400 Manzanita Drive	T°0	100°T	49	
056A	6837 Aitken Drive	80°T	160°T	36	
057C	6433 Westover Drive	65°T	316°T	34	
058B	6758 Saroni Drive	137°T	302°T	47	
059B	2181 Andrews Street	5°T	85°T	47	
060B	5879 Scarborough Drive	3 7° Т	88°T	49	
062A	2997 Holyrood Drive	33°T	81°T	45	
)63B	2679 Mountain Gate Way	21°T	88°T	45	
)64E	10 El Patio Street	$T^{\circ}0$	80°T	35	
70C	95 Castle Park Way	29°T	110°T	47	
71A	3343 Crane Way	T°0	70°T	45	
74A	6925 Pinehaven Road	72°T	355°T	46	
75B		$T^{\circ}0$	70°T	38	
73 D 77A	6776 Thornhill Drive	66°T	127°T	45	
77A 78A	6659 Girvin Drive	100°T	180°T	45	
79B	7380 Claremont Avenue	55°T	200°T	45	
79 . 81A	6757 Sobrante Road	70°T	159°T	45	
	Shepherd Canyon Road and Escher Drive	56°T	209°T	31	
ıble 1. Ne	w Cingular Wireless Nodes Evaluated				

Study Results

For a person anywhere at ground, the maximum RF exposure level due to the proposed operation through is calculated to be $0.0036~\mathrm{mW/cm^2}$, which is 0.69% of the applicable public exposure limit. The maximum calculated level at the second-floor elevation of any nearby building* is 3.2% of the

Including nearby residences located at least 9 feet from any pole, based on photographs from Google Maps.



AT&T Mobility • 32 Proposed Distributed Antenna System Nodes Oakland Hills • Oakland, California

public limit. It should be noted that these results include several "worst-case" assumptions and therefore are expected to overstate actual power density levels from the proposed operation.

Recommended Mitigation Measures

Due to their mounting locations on utility poles, the AT&T antennas would not be accessible to the general public, and so no mitigation measures are necessary to comply with the FCC public exposure guidelines. To prevent occupational exposures in excess of the FCC guidelines, it is recommended that access near the antennas be limited to authorized personnel who have been adequately trained in RF safety and awareness. No access within 3 feet directly in front of the antennas themselves, such as might occur during maintenance work on the poles, should be allowed while the pertinent node is in operation, unless other measures can be demonstrated to ensure that occupational protection requirements are met. Posting explanatory signs[†] at the antennas and/or on the poles below the antennas, such that the signs would be readily visible from any angle of approach to persons who might need to work within that distance, would be sufficient to meet FCC-adopted guidelines.

Conclusion

Based on the information and analysis above, it is the undersigned's professional opinion that the proposed operation of these AT&T Mobility nodes located in Oakland, California, will comply with the prevailing standards for limiting public exposure to radio frequency energy and, therefore, will not for this reason cause a significant impact on the environment. The highest calculated level in publicly accessible areas is much less than the prevailing standards allow for exposures of unlimited duration. This finding is consistent with measurements of actual exposure conditions taken at other operating base stations. Training of authorized personnel and posting explanatory signs is recommended to establish compliance with occupational exposure limitations.

[†] Signs should comply with OET-65 color, symbol, and content recommendations. Signage may also need to comply with the requirements of California Public Utilities Commission General Order No. 95.



AT&T Mobility • 32 Proposed Distributed Antenna System Nodes Oakland Hills • Oakland, California

Authorship

The undersigned author of this statement is a qualified Professional Engineer, holding California Registration Nos. E-13026 and M-20676, which expire on June 30, 2015. This work has been carried out under his direction, and all statements are true and correct of his own knowledge except, where noted, when data has been supplied by others, which data he believes to be correct.

February 6, 2014



William F. Hammett, P.E.

707/996-5200





Planning Commission Public Notice, Case File No. PLN14036

3 messades

Thomas Garten <tomgarten@yahoo.com>
Reply-To: Thomas Garten <tomgarten@yahoo.com>
To: Maurice <MHackett@oaklandpet.com> Melyssa Min

Wed, Sep 3, 2014 at 2:50 PM

To: Maurice <MHackett@oaklandnet.com>, Melyssa Minamoto <melyssa@gmail.com>

Mr. Hackett:

I'm writing to follow up on my voicemail from earlier today. First, thank you again for speaking with my wife, Melyssa, regarding AT&T's application. We are trying our best to come up to speed in the very short amount of time that we have been given, and we appreciate your assistance.

In order to prepare for the September 17th Hearing, we are trying to identify the exact City of Oakland Planning Code chapters that govern AT&T's application for PLN14036. The Public Notice, which is posted in front of the utility pole, states "Permits Required: Major Design Review and additional findings for *Macro Telecommunications facilities* within a residential zone." Based on my review of various Code chapters, it is my understanding that must meet the conditions set forth in the following sections:

1. Chapter 17.128 Telecommunications Regulations

- -- 17.128.070 governs criteria for "Macro Facilities," including those proposed to be located on existing poles.
 - -- 17.128.110 Site Location Preferences
 - -- 17.138.120 Site Design Preferences
 - -- 17.138.130 Radio frequency emissions standards

2. Chapter 17,134 Conditional Use Permit Procedure

- -- 17.134.040 Procedures for Consideration
- -- 17.134.050 General Use Permit Criteria

*I believe that the conditional use permit is necessary in this application because 17.128.070 Macro Facilities states that conditional permit criteria must be met.

3. Chapter 17.136 Design Review Procedure

- -- 17.136.040 states that "Proposals for new or modified Telecommunications Facilities" are subject to regular design review.
 - -- 17.136.050 provides regular design review criteria.

*To be candid, 17.136.050 Part B is the only provision that might potentially apply to telecommunications facilities, and even that is questionable.

Would you please confirm that this is the case? And if not, would you please explain why and identify the code sections that you believe are applicable here? It is imperative that we understand exactly what criteria will be applied so that we can be prepared to address those criteria at the upcoming hearing. We will also need a copy of AT&T's application, which my wife requested yesterday.

Finally, will you be preparing the staff report for PLN14036, which I understand will be available to the public at 3:00 pm on Friday, Sept. 12th?

Thanks again for your cooperation.

Best regards,

Tom Garten 1300 Mountain Boulevard Oakland, CA 94611

Hackett, Maurice <MHackett@oaklandnet.com>

Thu, Sep 4, 2014 at 10:34 AM

To: Thomas Garten <tomgarten@yahoo.com>, Melyssa Minamoto <melyssa@gmail.com>

Hello Mr. Garten.

As I explained in a previous conversation with your wife this project only requires a Major Design Review (major being the review on the proposal by the Planning Commission). The language on the public notification letter was generated by a relatively new computer program that inadvertently included information from the initial project intake months ago when the project was taken in with a conditional use permit included in error. This was modified because the project does not require a conditional use permit since the site/ poles are within the public right of way, however the permit system still generated the notice based upon the initial incorrect application intake. The project does require Design Review (section 17.136) because it is located within a residential zone where any addition or alteration to facilities requires Design Review. The project must also meet the additional Macro Telecommunications findings (Section 17.128). I checked in with my supervisor and he assured me that the necessary information was included for notification purposes since the required permits were stated. We will clarify the incorrect additional information at the public hearing.

I apologize for the confusion. I will forward a copy of the Staff Report when it is released, which should be around September 12th.

Thank you for addressing your concerns to staff.

Moe

Moe Hackett, Planner II | City of Oakland | Bureau of Planning | 250 Frank H. Ogawa, Suite 2114 | Oakland, CA 94612 | Phone: (510) 238-3973 | Fax: (510) 238-4730 | Email: mhackett@oaklandnet.com | Website: www.oaklandnet.com/planning

From: Thomas Garten [mailto:tomgarten@yahoo.com]
Sent: Wednesday, September 03, 2014 2:51 PM

To: Hackett, Maurice; Melyssa Minamoto

Subject: Planning Commission Public Notice, Case File No. PLN14036

[Quoted text hidden]

Reply-To: Thomas Garten <tomgarten@yahoo.com>
To: "Hackett, Maurice" <MHackett@oaklandnet.com>, Melyssa Minamoto <melyssa@gmail.com>

Mr. Hackett:

Thanks for your email. I appreciate your confirmation that the Design Review (17.136) and Telecommunications Regulations (17.128) Chapters will apply in this action.

I am confused, however, by your statement that PLN14036 does not require a conditional use permit (CUP) since the site/poles are in the public right of way. I cannot find any regulation that provides an exemption from the CUP process where the equipment is to be installed on an existing pole. Can you provide a citation for me?

In fact, it seems that Chapter 17.128 -- which you have said applies to AT&T's application -- specifically requires a CUP in all cases where the proposed facility is to be located in or near a residential zone. For example, Chapter 17.128.025 states that "Any Telecommunications Facility shall not be permitted in, or within one hundred (100) feet of the boundary of, any residential zone . . . except upon the granting of a conditional use permit pursuant to the conditional use permit procedure in Chapter 17.134." The same language is included in Chapter 17.134.020 itself, which confirms that such telecommunications facilities must be subjected to the CUP process. Accordingly, even if the utility pole is in the public right of way, that limited public right of way is surrounded on all sides by a residential zone. I see no basis to circumvent the CUP process here.

I am concerned that the regulations are not being applied properly by the Bureau of Planning -- not just in this case, but in many of the various applications that have been filed by AT&T in the Oakland Hills over the past year. For that reason, I will be writing to the City Attorney's office to obtain input on this issue. I will copy you on that correspondence.

Finally, I'd like to note that the notification process has been a mess. As you correctly point out, there are errors in the notice. Not only is the description of the project inaccurate, but Matt Yergovich's phone number is incorrect, the owner of the utility pole appears to be misidentified, there is no information regarding the "Environmental Determination" associated with the project, and the City did not comply with its own law requiring notice to be mailed to all residents residing within 300 feet of the property involved not less than 17 days before the hearing. It is not enough to say that these things will be corrected at the hearing. Residents cannot be expected to submit all applicable evidence at the initial hearing -- which they must do because residents cannot raise new evidence on appeal -- when they are being informed for the first time at the hearing what the scope of the project is. I know that this is not a new concern; others have raised the deficient noticing process to the Commission and others, yet it appears that nothing has been done. It's very frustrating.

Best regards, Tom Garten [Quoted text hidden]





Laws Applicable to AT&T Cell Tower Applications in the Oakland Hills

î message

Thomas Garten <tomgarten@yahoo.com>

Thu, Sep 4, 2014 at 12:33 PM

Reply-To: Thomas Garten <tomgarten@yahoo.com>

To: "bparker@oaklandcityattorney.org"

<jsmith@oaklandcityattorney.org", "jsmith@oaklandcityattorney.org", "jsmith@oaklandcityattorney.org", "dmoreno@oaklandcityattorney.org", "dmoreno@oaklandcityattorney.org", "dmoreno@oaklandcityattorney.org", "hlee@oaklandcityattorney.org", Maurice <MHackett@oaklandnet.com>, Melyssa Minamoto <melyssa@gmail.com>

Dear City Attorney Members:

As you may already know, AT&T has filed dozens of applications in the Oakland Hills to install wireless telecommunications facilities in front of existing residences. This has raised many concerns for residents, and increasingly there have been efforts to combat the installation of the equipment by challenging the applications at the Planning Commission and by pursuing appeals to the City Council (at a cost of approximate \$1,400.00).

There is a key issue that I would like to bring to the attention of the Office of the Oakland City Attorney. In certain cases -- including the application for a telecommunications facility on a utility pole located in front of my house -- it appears that the Applicant, Bureau, and Commission have not been applying the Conditional Use Permit standards set forth in Chapter 17.134. I wrote to Mr. Hackett, the City Planner II tasked with AT&T's application in front of my home (copied on this email), to raise my concern. I have pasted that correspondence into this email below.

I would appreciate it if the Office of the City Attorney would weigh in on this issue. Residents are receiving very little notice with regard to these proposed towers (approximately 20 days), and the uncertainty regarding the applicable laws only serves to undermine the purpose of the public notice. Should you wish to do so, I am available to discuss by phone at 408-655-6329.

Best Regards,

Tom Garten 1300 Mountain Boulevard Oakland, CA 94611

EMAIL CORRESPONDENCE WITH MR. HACKETT:

On Thursday, September 4, 2014 12:04 PM, Thomas Garten <tomgarten@yahoo.com> wrote: Mr. Hackett:

Thanks for your email. I appreciate your confirmation that the Design Review (17.136) and Telecommunications Regulations (17.128) Chapters will apply in this action.

I am confused, however, by your statement that PLN14036 does not require a conditional use permit (CUP) since the site/poles are in the public right of way. I cannot find any regulation that provides an exemption from the CUP process where the equipment is to be installed on an existing pole. Can you provide a citation for me?

In fact, it seems that Chapter 17.128 -- which you have said applies to AT&T's application -- specifically requires a CUP in all cases where the proposed facility is to be located in or near a residential zone. For example, Chapter 17.128.025 states that "Any Telecommunications Facility shall not be permitted in, or within one hundred (100) feet of the boundary of, any residential zone . . .

except upon the granting of a conditional use permit pursuant to the conditional use permit procedure in Chapter 17.134." The same language is included in Chapter 17.134.020 itself, which confirms that such telecommunications facilities must be subjected to the CUP process. Accordingly, even if the utility pole is in the public right of way, that limited public right of way is surrounded on all sides by a residential zone. I see no basis to circumvent the CUP process here.

I am concerned that the regulations are not being applied properly by the Bureau of Planning -- not just in this case, but in many of the various applications that have been filed by AT&T in the Oakland Hills over the past year. For that reason, I will be writing to the City Attorney's office to obtain input on this issue. I will copy you on that correspondence.

Finally, I'd like to note that the notification process has been a mess. As you correctly point out, there are errors in the notice. Not only is the description of the project inaccurate, but Matt Yergovich's phone number is incorrect, the owner of the utility pole appears to be misidentified, there is no information regarding the "Environmental Determination" associated with the project, and the City did not comply with its own law requiring notice to be mailed to all residents residing within 300 feet of the property involved not less than 17 days before the hearing. It is not enough to say that these things will be corrected at the hearing. Residents cannot be expected to submit all applicable evidence at the initial hearing -- which they must do because residents cannot raise new evidence on appeal -- when they are being informed for the first time at the hearing what the scope of the project is. I know that this is not a new concern; others have raised the deficient noticing process to the Commission and others, yet it appears that nothing has been done. It's very frustrating.

Best regards, Tom Garten

On Thursday, September 4, 2014 10:34 AM, "Hackett, Maurice" <MHackett@oaklandnet.com> wrote: Hello Mr. Garten.

As I explained in a previous conversation with your wife this project only requires a Major Design Review (major being the review on the proposal by the Planning Commission). The language on the public notification letter was generated by a relatively new computer program that inadvertently included information from the initial project intake months ago when the project was taken in with a conditional use permit included in error. This was modified because the project does not require a conditional use permit since the site/ poles are within the public right of way, however the permit system still generated the notice based upon the initial incorrect application intake. The project does require Design Review (section 17.136) because it is located within a residential zone where any addition or alteration to facilities requires Design Review. The project must also meet the additional Macro Telecommunications findings (Section 17.128). I checked in with my supervisor and he assured me that the necessary information was included for notification purposes since the required permits were stated. We will clarify the incorrect additional information at the public hearing. I apologize for the confusion. I will forward a copy of the Staff Report when it is released, which should be around September 12th.

Thank you for addressing your concerns to staff.

Moe

Moe Hackett, Planner II I City of Oakland I Bureau of Planning I 250 Frank H. Ogawa, Suite 2114 I Oakland, CA 94612 I Phone: (510) 238-3973 I Fax: (510) 238-4730 I Email: mhackett@oaklandnet.com I Website: www.oaklandnet.com/planning

From: Thomas Garten [mailto:tomgarten@yahoo.com] Sent: Wednesday, September 03, 2014 2:51 PM

To: Hackett, Maurice; Melyssa Minamoto

Subject: Planning Commission Public Notice, Case File No. PLN14036

Mr. Hackett:

I'm writing to follow up on my voicemail from earlier today. First, thank you again for speaking with my wife, Melyssa, regarding AT&T's application. We are trying our best to come up to speed in the very short amount of time that we have been given, and we appreciate your assistance.

In order to prepare for the September 17th Hearing, we are trying to identify the exact City of Oakland Planning Code chapters that govern AT&T's application for PLN14036. The Public Notice, which is posted in front of the utility pole,

states "Permits Required: Major Design Review and additional findings for *Macro Telecommunications facilities* within a residential zone." Based on my review of various Code chapters, it is my understanding that must meet the conditions set forth in the following sections:

1. Chapter 17.128 Telecommunications Regulations

- -- 17.128.070 governs criteria for "Macro Facilities," including those proposed to be located on existing poles.
- -- 17.128.110 Site Location Preferences
- -- 17.138.120 Site Design Preferences
- -- 17.138.130 Radio frequency emissions standards

2. Chapter 17.134 Conditional Use Permit Procedure

- -- 17.134.040 Procedures for Consideration
- -- 17.134.050 General Use Permit Criteria

*I believe that the conditional use permit is necessary in this application because 17.128.070 Macro Facilities states that conditional permit criteria must be met.

3. Chapter 17.136 Design Review Procedure

- -- 17.136.040 states that "Proposals for new or modified Telecommunications Facilities" are subject to regular design review.
 - -- 17.136.050 provides regular design review criteria.

*To be candid, 17.136.050 Part B is the only provision that might potentially apply to telecommunications facilities, and even that is questionable.

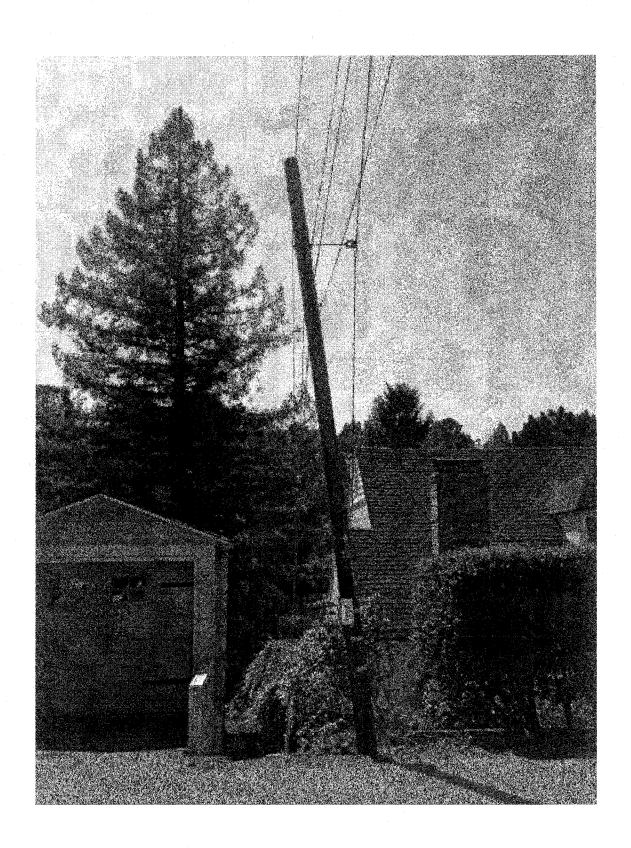
Would you please confirm that this is the case? And if not, would you please explain why and identify the code sections that you believe are applicable here? It is imperative that we understand exactly what criteria will be applied so that we can be prepared to address those criteria at the upcoming hearing. We will also need a copy of AT&T's application, which my wife requested yesterday.

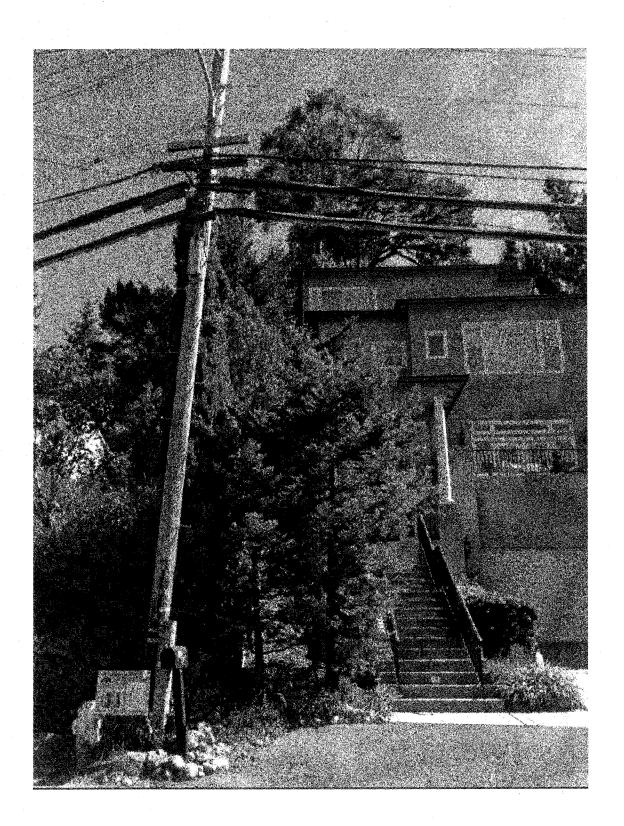
Finally, will you be preparing the staff report for PLN14036, which I understand will be available to the public at 3:00 pm on Friday, Sept. 12th?

Thanks again for your cooperation.

Best regards, Tom Garten 1300 Mountain Boulevard Oakland, CA 94611

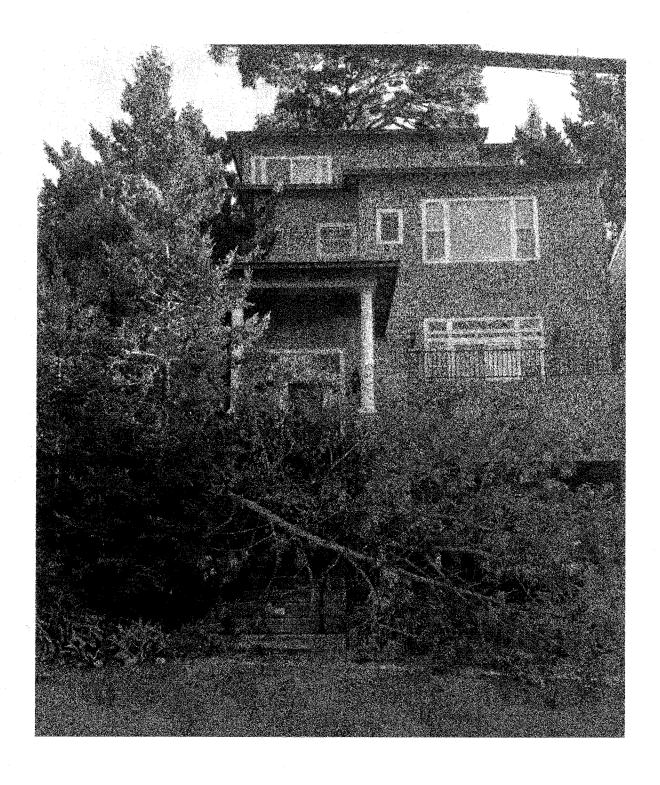














Power poles topped with communications gear go unchecked

BY: Hans Laetz

POSTED: 12:00 AM, Apr 23, 2009

TAG: county news (/topic/county+news) | local news (/topic/local+news)

A wind-whipped 2007 wildfire that destroyed 14 structures in Malibu has sparked a probe into why Southern California Edison is allowing various wireless communications companies to add heavy, wind-catching cables and antennas to wooden electric-wire poles without calculating possible collapse risk.

Some government officials say the utility's decision may mean that no one is keeping track of weight and wind-load dangers on power poles across Edison's 50,000-square-mile service area, home to 13 million people in Ventura and 10 other counties.

Malibu Mayor Andy Stern was aghast at the state's inquiry into who, if anyone, was in charge of making sure utility poles are not top-heavy.

"If Edison is not responsible for the safety of its own poles, then who the hell is?" Stern asked. "Why are we learning this now, when there are hundreds of these poles in Malibu?"

The formal probe by the California Public Utilities Commission was triggered by the collapse of three utility poles in Malibu Canyon on Oct. 17, 2007, which snapped in 50-mph winds. The wooden poles had just passed a state-mandated inspection by Edison, and should have withstood winds of 92 mph. State investigators are looking into the likelihood that they were overburdened by new cellular phone gear.

An Edison spokesman said the matter was under litigation and formal comment would have to come from the company's response to PUC's investigation, which is due to be filed soon.

The three poles were supporting four sets of heavy, insulated fiber-optic trunk lines; cell antennas; a 66,000-volt electrical circuit; a 16,000-volt local distribution circuit; and street

lights. The gear toppled onto the road with such force that a guy-wire yanked a 2,600-pound concrete anchor from surrounding rocks, landing in the middle of Malibu Canyon Road, the state report says.

In fours hours, the subsequent fire burned 3,836 acres, 10 houses, a landmark Malibu castle, several businesses and classrooms at two schools. Three firefighters were injured putting out the fire, and central Malibu was evacuated for three days.

Reports from the Los Angeles County Fire Department and field investigations by PUC staff "provide us with a prima facie (presumed true) showing that violations have occurred and that the Malibu fire stems from the violations," state investigator Kan Wai Tong wrote in a report that was adopted Jan. 29 in an unanimous vote of the Public Utilities Commission in San Francisco. The poles did not meet PUC requirements, he wrote.

Although the five commissioners voted to accept the report and open the investigation in late January, the decision was not publicized. Officials in Ventura County and other cities say they were not notified about the probe. Under PUC rules, the quais-judicial investigation may take months to conclude and could result in a new state rule on the matter.

"If the poles had been maintained, inspected, and constructed in compliance with the applicable PUC general orders, the poles clearly would have withstood the winds," Tong wrote.

Phone company officials said they cannot talk on the record because of myriad lawsuits filed over the fire. But one said the PUC finding was preliminary and erroneously relies on a presumed 50-mph maximum wind gust based on measurements in Calabasas, nine miles away, and winds exceeded 100 mph in the canyon that night.

Edison is a state-regulated utility owned by the shareholders of Edison International, a forprofit company that could be on the hook for hundreds of millions of dollars in damages from this one fire alone.

Four cellular companies involved

The unusual investigation was ordered after a senior Edison safety investigator asserted in

writing that calculating overall wind and weight loads on power poles had become the responsibility of four cellular companies that bought access to the poles in the past two decades.

"Edison contends in its letter that Edison was not required to approve the additional load added by other parties," Tong says in his report.

The PUC said Edison and four cellular companies — Verizon, Sprint, AT&T and NextG Networks — apparently failed to coordinate weight loads with each other, or properly measure just how sturdy the aging poles were as heavy new cables and cellular phone transceivers and antennas were added. PUC rules state all utilities that use aerial lines jointly share in responsibility for all aspects of their safety. And state common law includes the legal theory of "joint and several liability," meaning every partial owner is responsible for the entire damage bill caused by a negligent act by it or any other defendant, said Jack Sweeney, a longtime Thousand Oaks attorney.

Sweeney, a professor at Ventura College of Law, said a pole owner "cannot escape liability for a failure of the pole by selling a part interest in the pole to another entity, which adds its own heavy cables to the weight already supported by the pole."

Los Angeles County Supervisor Zev Yaroslavsky said it was "absurd" that Edison believes it's not responsible for the safety of the poles after selling access to them to cell companies.

The PUC findings also confirmed the opinions of some Malibu Canyon-Las Virgenes Road residents, who had observed that the poles had been leaning toward the road for years.

PUC questions rejected

Two of the wireless companies, AT&T and NextG, have rejected many of the state's questions as outside the purview of the Public Utilities Commission, because numerous damaged parties have filed lawsuits.

"AT&T objects to each question to the extent that it requests documents or information protected from disclosure by the attorney-client privilege ... and/or were prepared in anticipation of litigation," its company lawyers said.

AT&T lawyers specifically objected to being ordered by the state regulatory commission to explain exactly what caused the disastrous fire, and countered "there is no evidence establishing that the subject poles did not meet the safety factors" required by state law.

The firm also said it needs more time to gather documentation for wires that were installed by an outside contractor 17 years ago for a cellular phone company that has been sold four times since.

The PUC said Verizon could not provide an installation date but did provided wind load analysis from more than a decade ago. Sprint told the PUC it installed its gear in 1997 but could not find any records of weight calculations.

The final company to add equipment to the poles, NextG, installed its gear in 2004, but has no record of any weight or wind capacity calculations, the PUC report says. NextG is a San Jose company that installs cell transmitters on poles and links them with fiber cables for several service providers.

Malibu's mayor noted that hundreds of houses sit under older power poles heavily burdened with new communications cables.

"Those things are 4 feet away from people's houses, and they say 'No one is ultimately responsible to assess the weight loads on them?" Stern asked.

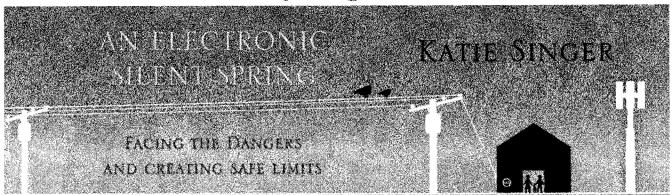
"Then you're telling me these are time bombs waiting to go off."

ANOTHER STORY OF INTEREST SPONSORED BY VIZIO

Sound so clear you can see it!

EXHIBIT 10

Electronic Silent Spring



Cell Tower Fires and Collapsing Towers

Compiled by Dr. David M. Stupin,
retired physicist, Los Alamos National Lab
A joint project of the EMR Policy Institute (www.emrpolicy.org)
and electronicsilentspring.com

Cellular phone gear (antennas) have snapped and caused severe fires. Towers have also collapsed due to construction errors (31%), to ice (29%), to special wind (19%), to aircraft (11%) and to anchor failure (10%). Here are reports of cell towers that have caught fire and collapsed.

Under the list, please find more information from science writer B. Blake Levitt about cell tower fires and collapses.

Cell Tower Fires

Compiled by Dr. David M. Stupin, retired physicist from Los Alamos National Laboratory.

4/14/2006 Temple Hills, Prince George County, MD

7/4/2007 Howell, MI

10/2007 Malibu, CA

5/10/2010 Madison, WI

5/10/2010 Madison, WI

1/13/2011 Rancho Cucamonga, CA

1/21/2011 Poulsbo, WA

1/22/2011 Wall, NJ, Tinton Falls, NJ and Neptune, NJ

1/22/2011 Wall, NJ, Tinton Falls, NJ and Neptune, NJ (video)

12/2/2011 Lilburn, GA

12/2/2011 Lilburn, GA

5/16/2013 Middletown, NJ

5/16/2013 Middletown, NJ (video)

6/21/2013 Bensalem, PA

7/8/2013 West Salem, OR 7/8/2013 Bensalem, PA 7/8/2013 Bensalem. PA 8/21/2013 Sanford, FL 1/6/2014 Brownsville, TX 1/6/2014 Brownsville, TX 2/4/2014 Las Vegas, NV

Collapsing Towers

Compiled by Dr. David M. Stupin, retired physicist from Los Alamos National Laboratory.

5/10/2003 Peoria, IL 11/2/2003 Oswego, New York 3/18/2008 La Merida, CA 1/24/2009 Wellesley, MA 11/10/2009 Torrance, CA 12/14/2009 Tulsa, OK 2/18/2011 Clinton, PA 4/4/2011 Ballard County, KY 10/31/2012 Associated Press - Hurricane Sandy takes out 25% of cell towers in US 3/6/2013 St Louis, MO 3/19/2013 Laredo, TX 5/16/2013 Middletown, NJ 5/28/2013 Copiah County, MS 7/8/2013 Bensalem, PA 7/8/2013 Bensalem. PA 7/20/2013 San Ramon, CA 10/1/2013 Willow, AK 10/20/2013 Jefferson County, MO 10/25/2013 Alascom, AK 1/13/2014 Chewelah, WA 2/2/2014 Clarksburg, WV (2 towers) 3/14/2014 North Adams, MA 3/26/2014 Blaine, KS 5/10/2014 Hudsonville, MI

For a list of videos showing cell tower collapses, please click here.

Cell tower worker deaths

Girl's cell phone catches fire under her pillow while she sleeps

Other Resources

The Canyon Area Residents for the Environment Ethics in Engineering at Texas A&M University

Notes from B. Blake Levitt

www.blakelevit.com

Electromagnetic Fields: A Consumer's Guide to the Issues and How to Protect Ourselves
Cell Towers, Wireless Convenience? Or Environmental Hazard? Proceedings of the 'Cell Towers Forum'
— State of the Science, State of the Law

Such potential problems are among the reasons why large setbacks from dwellings/schools/businesses are recommended — 1500′ minimum. Check out the two videos of burning towers — one has useful info for fire departments. Looks like these kinds of fires are unusual to fight and require creative approaches. Among the causes: overheating of equipment, improper cooling, lightning strikes, and others. One industry report found that if there's a tower, there is a 100%+ chance per year it will attract lightening. Even proper grounding does not always offset potential equipment damage/failure from such massive jolts and sudden ground current, including accessory building and generator explosions. Accessory buildings and generators contain sulphuric acid in batteries and diesel. That's why large setbacks — 400′ minimum — are recommended for accessory buildings from wetlands. These can be complicated sites.





Further Fire Safety Analysis Required Re: AT&T Planning Application PLN14036

Thomas Garten <tomgarten@yahoo.com>

Sat, Sep 6, 2014 at 1:35 AM

Reply-To: Thomas Garten <tomgarten@yahoo.com>

To: "Igriffin@oaklandnet.com" < Igriffin@oaklandnet.com>

Cc: "pattillo@pgadesign.com" <pattillo@pgadesign.com>, "jmoore.ocpc@gmail.com" <jmoore.ocpc@gmail.com>, "jahazielbonillaoaklandpc@gmail.com" <jahazielbonillaoaklandpc@gmail.com>, "michael@mbcarch.com" <michael@mbcarch.com>, "jmyres.oakplanningcommision@gmail.com" <jmyres.oakplanningcommision@gmail.com>, "nagraiplanning@gmail.com" <nagraiplanning@gmail.com>, "ew.oakland@gmail.com" <ew.oakland@gmail.com>, "Ischaaf@oaklandnet.com" <Ischaaf@oaklandnet.com>, "myergovich@extenetsystems.com" <myergovich@extenetsystems.com>, "mhackett@oaklandnet.com" <mhackett@oaklandnet.com>, "dist5@acgov.org" <dist5@acgov.org>, "mp1@cpuc.ca.gov" <mp1@cpuc.ca.gov>, "mike.florio@cpuc.ca.gov" <mike.florio@cpuc.ca.gov>, "catherine.sandoval@cpuc.ca.gov" <catherine.sandoval@cpuc.ca.gov>, "carla.peterman@cpuc.ca.gov" <carla.peterman@cpuc.ca.gov>, "michael.picker@cpuc.ca.gov" <michael.picker@cpuc.ca.gov>, "fruhland@oaklandnet.com" <fruhland@oaklandnet.com>, Melyssa Minamoto <melyssa@gmail.com>

Dear Assistant Fire Marshall Griffin,

On 9/27, we saw a Public Notice from the City of Oakland posted in front of our home at 1300 Mountain Blvd (see attached). The notice states that AT&T has applied to the City to install "new macro telecommunications facilities (2 antennas and associate equipment cabinets)" on one utility pole between 1244 and 1300 Mountain Blvd. and on another pole between 1301 and 1265 Mountain Blvd to improve cell service for AT&T customers. There is a public hearing on 9/17 before the Oakland Planning Commission that will determine whether AT&T's application will go forward.

We have been in contact with Mr. Maurice Hackett of the Planning Bureau (the Case Planner on our file, PLN14036) and Mr. Matt Yergovich, the Applicant on behalf of AT&T, to seek out more detailed information on this project. Thus far, we have received the following information:

- · The utility poles at issue are jointly owned by several utilities; AT&T purchased a joint ownership interest in these poles to install the equipment.
- · The antennas proposed for the west utility pole (between 1301 and 1265 Mountain Blvd.) are covered by a casing that is approximately 3 feet tall x 2 feet wide, making the total height of the pole approximately 32 feet – an 8 foot increase.
- · The equipment cabinet is approximately 8 feet tall x 2 feet wide x 2 feet deep, and contains at least a backup battery and a "quadband flexwave prism." The cabinet is connected by above-ground cables to the antenna on the utility pole across the street.
- · The cabinet will be located on the utility pole between 10 feet and 18 feet off the ground.
- · To power the equipment cabinet, PG&E will install a meter and energy supply on the same utility pole.

The information that Mr. Hackett and Mr. Yergovich could or would not provide, despite our repeated

requests throughout this week, is as follows:

- The weight of the antennas, casing, anchors and associated cables on the west utility pole.
- The weight of the cabinet and associated cables on the east utility pole.
- · Whether AT&T or the City has done a structural or stability analysis on each of the poles, factoring in the additional equipment.
- · Whether AT&T or the City has done a fire safety, strong wind, or seismic analysis for each of the poles, factoring in the additional equipment.
- · Whether the antennas and equipment attract lightning.

We have attached some photos to this letter showing the utility poles in question. The poles appear to be older and the wood appears dry and weak. The poles also appear to lean toward the south and the east pole already has a metal brace at the base. The poles already support quite a bit of equipment. For example, the east pole carries several heavy cable(s) and wires and a streetlight. In addition, the proximity of these poles to vegetation and homes raises fire danger concerns.

This area is prone to earthquakes and fires. I was born and raised in Oakland and I will never forget how the 1991 Firestorm caused many deaths and destroyed my friends' homes. In November of 2011, our area experienced high winds, causing a tree to fall across the front part of our house, barely missing the house itself, our vehicles, and power lines (see attached photos). We were thankful that it was only a tree. Elsewhere, there is evidence that the addition of telecommunications equipment on utility poles does indeed pose a danger, and may lead to fires. See http://www.electronicsilentspring.com/primers/cell-towers-cell-phones/cell-tower-fires-collapsing/. For example, AT&T and other telecommunications companies overburdened utility poles in Malibu, California, which led to a devastating fire in 2007 after heavy winds. See http://www.vcstar.com/news/no-oversight-of-power-poles-topped-with-heavy. In addition, telecommunications equipment may catch fire on its own or during repair. See http://www.nbcphiladelphia.com/news/local/Cell-Phone-Tower-on-Fire-in-Bucks-County-212489511.html.

Placing the proposed equipment in such close proximity to vegetation and homes, and overburdening older utility poles poses a risk to our safety.

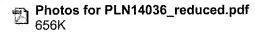
We hope that you can perform or initiate a structural analysis of the utility poles, taking into account the proposed addition of AT&T's equipment. At a minimum, please tell us who is responsible for these considerations? It worries us that both our Case Planner and AT&T were unable to provide any information regarding the structural integrity of the utility poles. All of the utility companies buying into these poles share in the responsibility for ensuring that the poles are safe. This now includes AT&T. This also includes the City of Oakland, whose Planning Department oversees the safety of AT&T's application.

Please visit the proposed site and see it for yourselves.

Sincerely, Melyssa Minamoto and Tom Garten

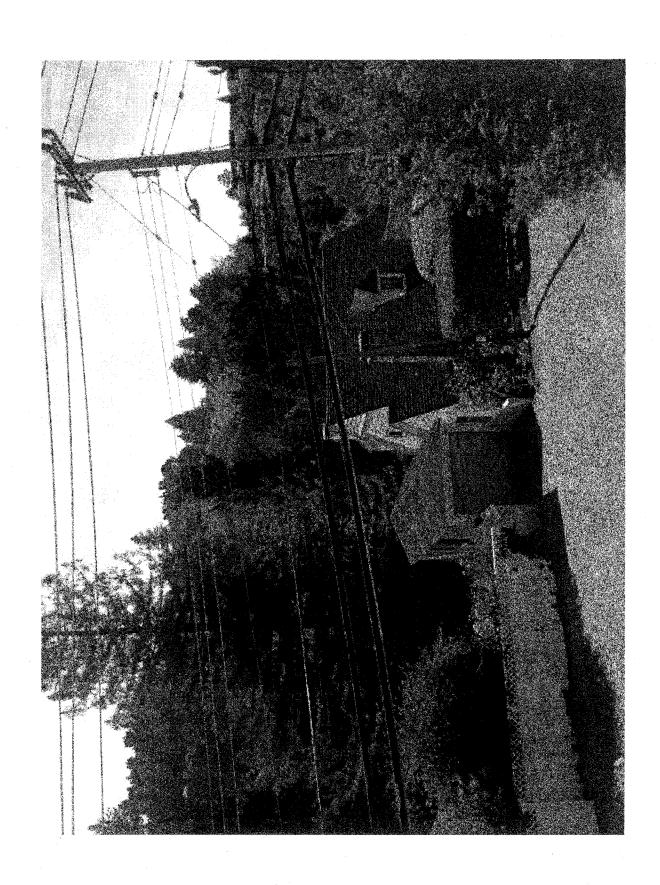
Cc: CPUC Commissioner President Michael R. Peevey CPUC Commissioner Michel Peter Florio CPUC Commissioner Catherine J.K. Sandoval CPUC Commissioner Carla J. Peterman
CPUC Commissioner Michael Picker
Alameda County District 5 Supervisor Keith Carson
Oakland City Council Member Libby Schaaf, District 4
All Oakland City Planning Commissioners
Oakland City Planner II, Maurice Hackett
Matt Yergovich, Applicant on behalf of AT&T

2 attachments



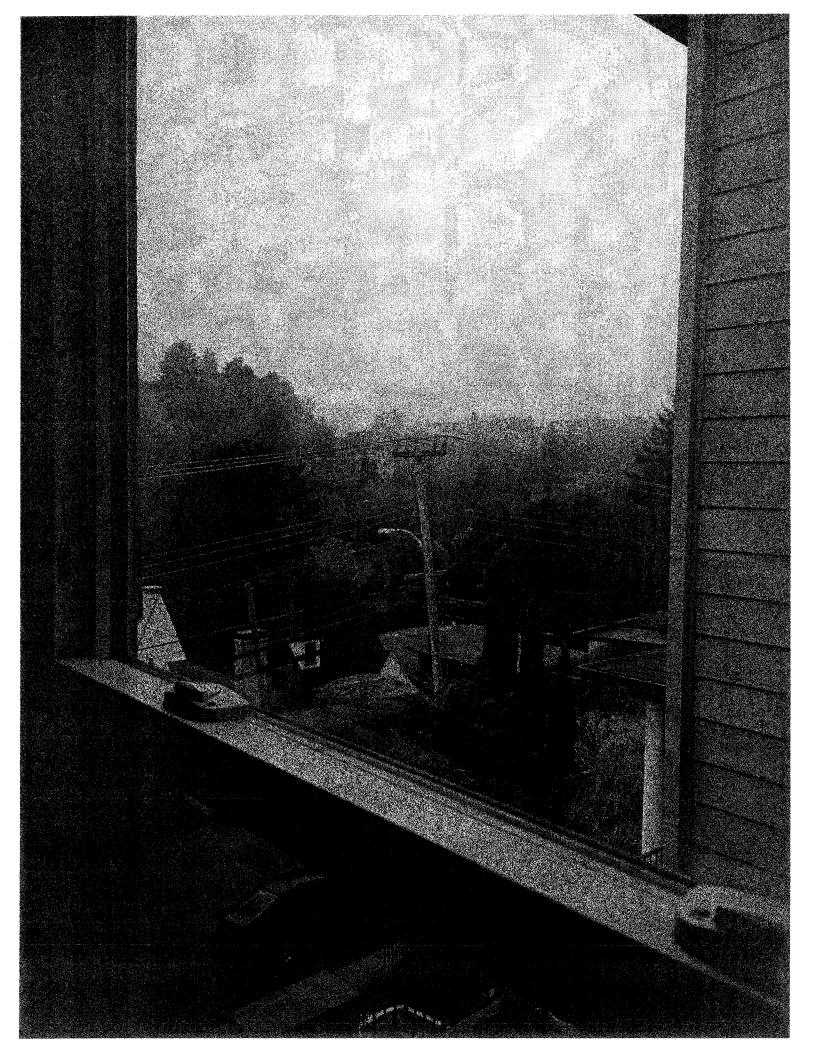
Public notice and site photos_reduced.pdf 877K



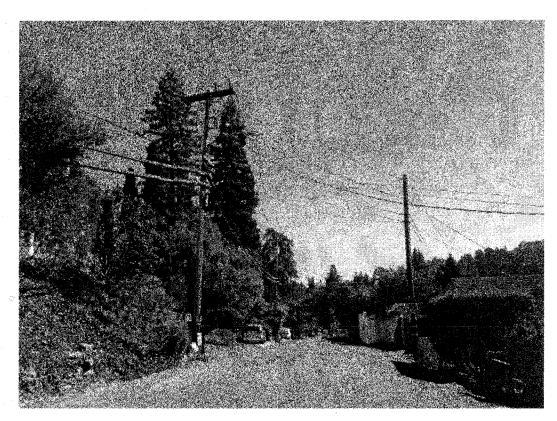












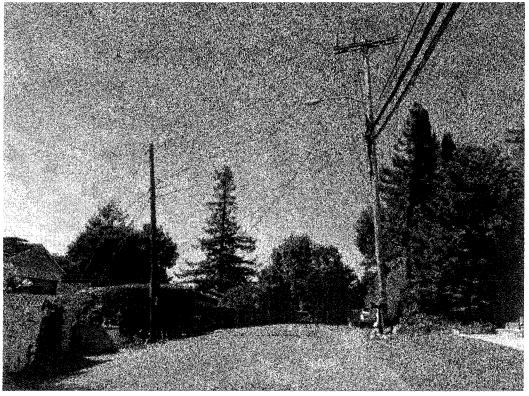


EXHIBIT 15

CELL PHONE TOWER PROXIMITY IMPACTS ON HOUSE PRICES: A NEW ZEALAND CASE STUDY

SANDY BOND Curtin University

ABSTRACT

The siting of cellular phone towers (CPBSs) is of particular public concern due to fears of potential health hazards from the electromagnetic fields (EMFs) that these devices emit. The unsightliness of these structures and fear of lowered property values are other regularly voiced concerns about the siting of CPBs. This paper outlines the results of further research to show the effect that distance to a CPBS has on residential property prices in New Zealand (NZ). The results of this research will be of interest to valuers when valuing properties in close proximity to CPBSs and for determining compensation, if any, to affected property owners.

Keywords: Cellular phone base stations, GIS, market perceptions, multiple regression analysis, property values

INTRODUCTION

There have been persisting concerns about the possible impact of cellular phones and cellular phone base stations on health due to the electromagnetic fields (EMFs) they emit. This was appreciated by the UK government, which in 1999 took the early initiative of setting up the Independent Expert Group on Mobile Phones (IEGMP) to review the situation. Its report, *Mobile Phones and Health* (the Stewart Report), published in May 2000, concluded that:

"....it is not possible at present to say that exposure to RF radiation, even at levels below national guidelines, is totally without potential adverse health effects, and that the gaps in knowledge are sufficient to justify a precautionary approach."

The Stewart report concluded a precautionary approach to the use of mobile phone technologies be adopted until much more detailed and scientifically robust information on any health effects becomes available.

Controversy remains about whether or not exposure of humans to electromagnetic fields can cause cancer. Some studies show an association between certain types of cancers and residential exposure to electromagnetic fields generated by radio, cellular phone and television transmitters (see for example, Hardell, Mild &

Carlberg, 2003; AGNIR, 2003; Chen et al., 2000; Michelozzi et al., 2002). However, a review of the evidence on cellular phones, cell phones base stations, and brain cancer by Moulder et al. (2005), concludes that "a weight-of-evidence evaluation shows that the current evidence for a causal association between cancer and exposure to RF energy is weak and unconvincing."

Due to the abovementioned controversy, there appears to be ongoing concern about the siting of cellular phone base stations (CPBSs) due to fears of health risks from exposure to EMFs, changes in neighborhood aesthetics and loss in property values. However, the extent to which such attitudes are reflected in lower property values affected by CPBSs is not well understood.

This paper outlines the results of research conducted in 2004 that follows an earlier study carried out in Christchurch, NZ in 2003 to show the effect that proximity to cellular phone base stations (CPBSs) has on residential property values. This current study looks specifically at the impact of distance to a CPBS on residential house prices. It involved the same case study areas in Christchurch city in the South Island of New Zealand as the previous study for comparison purposes. A summary of the results from the previous study are outlined in the literature review.

LITERATURE REVIEW

Property value effects from CPBSs

Few studies have been conducted to ascertain the adverse health and visual effects of cell phone towers on property values. Further, as there have been very few cell site cases proceeding to the Environment Court in NZ, only limited evidence of property value effects has been provided by the courts. Thus, the extent to which opposition from property owners affected by the siting of cell phone towers are reflected in lower property values is not widely known in NZ.

Bond and Beamish (2005) review the two studies commissioned by Telecom in Auckland, Whangarei and Hamilton (1998/99) as well as Christchurch (2001). The results of both studies showed that property prices are not statistically significantly affected by the presence of cell phone towers. However, both studies involved only limited sales data analysis. Further, Bond and Beamish suggest that as the sponsoring party to the research was a telecommunication company, it is questionable whether the results are completely free from bias.

Two parallel studies were carried out in Christchurch, NZ by Bond and Beamish (2005) and Bond and Wang (2005) to show the effect that proximity to cellular phone base stations (CPBSs) has on residential property values. The City of Christchurch was selected as the case study area due to the large amount of media attention this area had received in recent years relating to the siting of CPBSs. Two

prominent court cases over the siting of CPBSs were the main cause for this attention (McIntyre and others vs. Christchurch City Council [1996] NZRMA 289 and Shirley Primary School vs. Telecom Mobile Communications Ltd [1999] NZRMA 66). In summary, the Environmental Court ruled in each case that there is no established adverse health effects arising from the emission of radio waves from CPBSs as there is no epidemiological evidence to show this. However, in the court's decisions, they did concede that while there are no proven health affects that there is evidence of property values being affected by both of the above allegations.

These court cases were only the start of the negative publicity surrounding CPBSs in Christchurch. Dr. Neil Cherry, a prominent and vocal local professor, served only to fuel the negative attention to CPBSs by regularly publishing the health hazards relating to these structures (see Cherry, 2000). This media attention had an impact on the results of the studies, outlined next.

The first study by Bond and Beamish (2005) comprised a postal survey to investigate the perceptions of residents towards living near CPBSs and how this proximity might affect property values. The survey included residents in ten suburbs: five case study areas (within 100 feet of a cell phone tower) and five control areas (over 0.6 of a mile from a cell phone tower). Eighty questionnaires were distributed to each of the ten suburbs in Christchurch (i.e. 800 surveys were delivered in total). An overall response rate of 46% was achieved.

The results were mixed with responses from residents ranging from having no concerns to being very concerned about proximity to a tower. In both the case study and control areas, the impact of proximity to towers on future property values is the issue of greatest concern for respondents. If purchasing or renting a property near a tower, over a third (38%) of the control group respondents would reduce price of their property by more than 20%. The perceptions of the case study respondents were less negative with a third of them saying they would reduce price by only 1-9%, and 24% would reduce price by between 10 and 19%.

The second study by Bond and Wang (2005) used the standard hedonic methodology to quantify the effect of a CPBS on sale prices of homes located near these. The study included 4283 property sales in four suburbs that occurred between 1986 and 2002 (approximately 1000 sales per suburb). The sales data that occurred before a tower was built were compared to sales data after a tower was built to determine any variance in price, after accounting for all the relevant independent variables.

Interestingly, the effect of a tower on price (a decrease of between 20.7% and 21%) was very similar in the two suburbs where the towers were built in the year 2000, after the negative media publicity given to towers following the two legal cases outlined above. The other two suburbs that indicated a tower was either

insignificant or increased prices by around 12%, had towers built in them in 1994, prior to the media publicity.

The main limitation affecting this study was that there was no accurate proximity measure included in the model, such as GIS coordinates for each property. Instead, street name was included as an independent variable to help to control for the proximity effects. The current study uses GIS analysis to determine the impact that actual distance to a CPBS has on residential property prices.

Property value effects from high voltage overhead transmission lines

CPBSs are very similar structures to high voltage overhead transmission lines (HVOTLs) and their supporting structure, the pylons. Therefore, despite the limited research relating to value effects from CPBS, the body of literature on the property values effects from HVOTLs and pylons was reviewed by Bond and Wang (2005). Their review showed that proximity and views of pylons are more of a concern and affect price to a greater extent than do HVOTLs.

The price effect of the pylon does seem to be consistent between studies (i.e. negative and significant) ranging from between 12-27% depending on the distance to these. The closer the home is to a pylon, the greater the diminution in price. The effect diminishes to a negligible amount after 250 meters, on average. The impact of HVOTL-proximity on price is less certain, with this ranging from having no impact on price (the NZ study) to having a negative impact of up to 18% (the UK study).

The effects of media attention on price

Other studies confirm that media attention can have a significant impact on "stigma" and consequently prices of affected property in close proximity to environmental hazards. Slovic (1992) studied peoples' perceptions toward risks and benefits, and their preferences for various kinds of risk/benefit tradeoffs. In his discussion of stigma, Slovic associates this word with risk perception. From the results of his study he also suggests that aesthetics (ugly or upsetting), visibility, dangerous and disruptive are factors in stigmatization. He found that mechanisms of social amplification, such as heavy media coverage and attention drawn to problems by special interest groups, can increase the stigma. According to Flynn et al. (2004), the most powerful source of risk and stigma information is the news media.

A study by McCluskey and Rausser (2000) specifically addressed the existence, magnitude and duration of stigma relating to a lead smelter as changes in the relative risk occurred (before, during and after cleanup), and the causal effect on property values of media coverage over time. They found that media coverage of the environmental damage caused by the smelter had a significant negative effect on property values in close proximity to the site.

A book review by Siemens (2003) discusses the results of the authors' (van de Griendt and Wolleswinkel) Dutch-based contaminated land case. In 1980, the first scandal of a polluted residential district in the Netherlands became news when the media zoomed in on Lekkerkerk. In their research, van de Griendt and Wolleswinkel examined movements in the value of homes in two similar toxic residential districts in Maassluis: Steendijkpolder and Noord Nieuwlandspolder Zuid. In one of the districts that received a considerable amount of negative publicity, prices collapsed dramatically and took years to recover. In the other district, where there was little media attention to the contamination issues, there was hardly any fall in prices. Even more surprising is the fact that the price dip in the second district lasted briefly. Prices quickly returned to the old level and moved in line with price fluctuations elsewhere in the South Holland province. The research revealed that negative publicity could cause a sharp fall in the value of the property.

The researchers' noted a number of factors that play an important role in the fall of housing prices in polluted districts, with the two principal factors being psychology and stigmatization. The media hype hurt housing prices in Steendijkpolder and left a smear on homes in that district. On the other hand, there was relatively little media attention of the situation in Noord Nieuwlandspolder Zuid, so the homes there escaped the pollution label.

Kinnard et al. (1995) studied sales of homes near a remediated smelter site that received increased publicity over the remediation (nature and extent) due to highly publicized legal actions to recover damages. They compared sales of houses in the affected area to those outside and also looked at proximity affects (by grouping sales into varying distance zones from the smelter) using regression analysis in a hedonic framework. The results show that declines in sales volume and prices in affected area seems to be closely linked to major publicity. They conclude that when publicity is intense and on-going value impacts persist over time. Alternatively, when publicity diminishes or ceases negative value impacts diminish or go away within a relatively short time.

Despite the varying results reported in the literature on property value effects from HVOTLs, pylons and cell phone towers, each study adds to the growing body of evidence and knowledge on this (and similar) valuation issue(s). The study reported here is one such study.

Methodologies advocated to study property value effects

The literature dealing specifically with the measurement of the impact of environmental hazards on residential sale prices (including proximity to transmission lines, landfill sites and ground water contamination) indicates the popularity of hedonic pricing models, as introduced by Court (1939) and later Griliches (1971) and further developed by Freeman (1979) and Rosen (1974).

The more recent hedonic studies, including those by Colwell et al. (2003), Simons, Winson-Geideman, Mikelbank, (2001), and Hite et al. (2001), focus on proximity to an environmental hazard and demonstrate that this reduces residential house prices by varying amounts depending on distance from the hazard.

Thus, the method selected for the current study was a hedonic house price approach. GIS was also adopted to aid the analysis of distance to the CPBSs. The results from this study, together with the results from the previous parallel studies, will help test the hypothesis that proximity to a CPBS has a negative impact on property value and reveal the extent to which the market reacts to CPBSs.

METHODOLOGY

The method selected for this study was a hedonic house price approach. GIS was also adopted to aid the analysis of distance to the towers. The null hypothesis states that being located near a CPBS does not affect property sales prices.

Data

Sales were required both before and after the tower was built to study the effect of the existence the tower had on the surrounding property's sale prices. Residential properties that sold between 1986 and 2002, the years during which the towers were constructed and were closest to the towers were selected.

For comparison purposes, the data set included the same data as for the previous hedonic study but included a further six suburbs to give a total of ten suburbs: five suburbs with CPBSs located in them and five control suburbs without CPBSs. A total of 9,514 property sales were obtained from Headways Systems Ltd (approximately 1000 sales per suburb). The dataset was cleaned to address missing values and inconsistent coding for some variables. The observations in each suburb are listed below in Table 1. As there were no sales data available after the CPBS was built in the Upper Riccarton suburb it was not included in the analysis of the individual suburbs.

Table 1: Property data

Suburbs with a CPBS	Observations before CPBS built	Observations after CPBS built	Suburbs without a CPBS	Observations
St Albans	205	864	Avonhead	923
Beckenham	963	209	Bromley	951
Bishopdale	921	38	Linwood	921
Papanui	1000	79	Ilam	558
Up. Riccarton	913	0	Spreydon	969

The other part of the data was a SAS dataset which contained 130,082 observation properties, including the land parcels where the CPBSs were located. The data for each observation property consisted of the property address and the geographical $\{x, y\}$ coordinates that relate to the property's absolute location. There were some record errors in the suburbs of Beckenham and Spreydon as indicated by coordinates for some properties being vastly different to coordinates of other properties in the same suburb. These outlier coordinates represented locations at some distance from the suburb they were supposed to relate to, so they were removed from the data.

The two datasets containing 9,514 and 130,082 observations, respectively, were combined to provide 9,514 geo-coded house sale observations. The Cartesian latitudinal and longitudinal coordinates relating to the absolute location of the CPBSs are listed in Table 2.

Table 2: Geographical coordinates of the CPBSs

	Location	X	Y
St Albans(Telecom)	21-25 St Albans	2479608	5743830
Beckenham (Telecom)	148A Colombo Street	2480672	5738843
Bishopdale (Vodafone)	333 Harewood Rd	2476538	5746604
Papanui (Telecom)	48 Langdons Road	2478088	5745987
Upper Riccarton (Telecom)	57 Peer Street	2475330	5742286

Variable selection

As each CPBS was built at a different date, the sales from each suburb were separately analysed, as well as together as a group. The uniformity of locational and neighbourhood characteristics in each of these suburbs allows the analysis to be simplified and focused on the properties' physical attributes. The relative homogeneity of housing, locational and neighbourhood attributes was verified through field inspections. The study investigates the potential impact of proximity to a tower on the price of residential property, as indicated by the dependant variable: SLNETX.

The independent variables used in the previous hedonic study were adopted for this study but the distance proxy variable, street name SISTX, and time variable, TIMESOLD.Q were replaced with new, more accurate distance and time variables. Further, the AGE variable used in the previous study was calculated in a different manner for the current study and renamed NEWAGE. The variable descriptions are listed in Table 3.

Table 3: Variable descriptions

Variable:	Definition:
DSLNETX ¹	CPI-deflated sales price of the house (NZ\$)
TOWER	An indicator variable: 0 if before the tower was built, or 1 after the tower was built.
Inv.dist	The inverse of the square root distance to a CPBS on the non-zero distances to measure the effect of distance on property price.
DIST	Distance rings comprising four levels defined around the CPBS, from level "0" which denotes there was no CPBS built when the properties were sold to level "3" which denotes the distance between sold properties and the CPBS is greater than 600 meters.
CATGYX2	Category of dwelling: D, E, etc
CATGYX4	Quality of the structure: A, B, C
SLDATX	Actual date when the property sold.
NEWAGE	The year the house was built.
LANDAX	Land area (ha).
MATFAX	Total floor area (m ²).
WALLCNX	Wall construction: W, B, C, etc.
ROOFCNX	Roof construction: W, B, C, etc.

¹ Sales price is the dependent variable.

Time adjusting property sales price

Due to the effect of time on property sales prices, time must be allowed for in the model to permit a price comparison from one period to another. One way to account for this is to deflate the sales price by the corresponding consumer price index (CPI). Preferably this would be the house component of the CPI in the relevant study area. In this research, the sales data came from Christchurch city so the Christchurch house component of CPI should be used to deflate the sales prices of the properties. However, since only a national house CPI is available from Statistics New Zealand, this was used to deflate the sales prices in the data set. As a precaution, time was included as an explanatory variable (SLDATX) in all the regression models. This variable represents the actual sales date. As SLDATX was generally significant, it would appear that using the CPI-deflated house price, DSLNETX, does not completely diminish the time effect on the sales price.

Distance to the CPBS

The hypothesis and main focus for this study is that we expect that property price will be lower the closer the property is to a CPBS. To measure the effect of distance on property price two methods were used. One method was to treat the distance numerically in the model. Where a property was sold before the CPBS

was built the distance is recorded as zero. The non-zero distance measurements indicate the distance between the CPBS and properties.

The distribution plot of distance against property price indicated that there was not a strong relationship between the two variables so the distance variable was transformed to better capture the relationship between the distance and property price. The inverse of the square root distance on the non-zero distances provided a much better distribution pattern. The new variable, called inv.dist, shows that as the distance increases, inv.dist decreases; if the distance decreases, inv.dist increases.

The second method used to measure the effect of distance involved making a new categorical variable. First, the distance was determined from the X and Y coordinates of each property and the CPBSs. The categorical variable, *DIST*, was then established containing four levels. The four levels comprised circular rings that were defined around the CPBS based on distances to it. The first level "0" denotes there was no CPBS built when the properties were sold. The second level "1" denotes that the distance between sold properties and the CPBS is between 0 to 300 meters, the third level "2" denotes that the distance between sold properties and the CPBS is between 301 to 600 meters, and the fourth level "3" denotes the distance between sold properties and the CPBS is greater than 600 meters.

These distance rings are within the range of distances used in other similar proximity studies of the effects of high voltage overhead transmission lines, hazardous waste and railway tracks on property values (see for example: Hamilton and Schwann (1995), they used 100m and 200m distances as did Strand and Vagnes (2001); Reichert (1997) used four 2250ft (658m) concentric zones; Colwell (1990) used 50ft (15m), 200ft (60m) and greater than 200ft (60m) distances; Bond and Hopkins (2000) and Des Rosiers (2002) both used 50m (165ft) concentric zones).

House age

For the age of homes, a different variable was adopted to that used in the previous hedonic study. The new variable called *NEWAGE* was calculated by subtracting the sales date of the property from the time the property was built. This was used to calculate the actual age of the property at the date the property was sold rather than when the market study was conducted as in the previous study. It is expected that house age will have a negative effect on property price (except for homes of an historic nature that commonly have a positive impact on price).

Property categories

The variable *CATGYX* comprises four characters indicating the type, age and quality of residential property. The first character indicates the zoning of the property. As this was the same for every property (i.e. "R" indicating residential), it was not included in the analysis. Also, the third character that records the decade

during which the structure was built was excluded from the analysis as building age is taken into account in the NEWAGE variable. The second character describes the type of residence (for example, single family home, home ownership units, etc). The last character records the quality of the structure.

Wall and roof materials

The variables *WALLCNX* and *ROOFCNX* indicate the types of wall and roofing materials of the home. While both variables supposedly have 13 levels representing the different materials most of the roofing materials are recorded as iron, tile or concrete. Thus, for the analysis of *ROOFCNX* only these three materials were used but with an additional material denoted by "O" which included all other types of roofing material.

Before presenting the final multiple regression results, the section following outlines the results of an initial exploratory data analysis.

EXPLORATORY DATA ANALYSIS

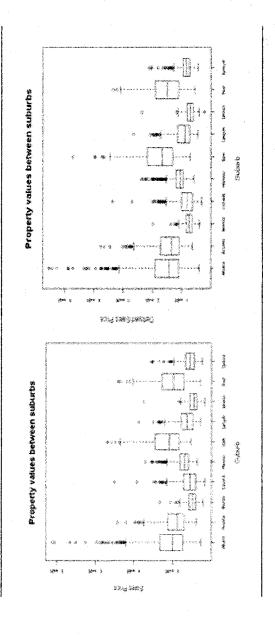
In order to better understand the data, an exploratory analysis was undertaken to compare sales prices between the suburbs with a CPBS and those suburbs without a CPBS and to compare sale prices over time.

Housing characteristics

Property prices between suburbs

Figure 1 shows there is considerable difference in property prices between the different suburbs. Property prices in St Albans, Ilam, Avonhead and Upper Riccarton are much higher than prices in the other suburbs. This confirms the demographic statistics obtained for each suburb (as presented in Bond and Beamish, 2005). Residents from these four suburbs had the highest levels of household and family incomes as well as the highest levels of education. Due to these differences, a separate analysis was undertaken for each suburb together with a combined analysis for all suburbs.

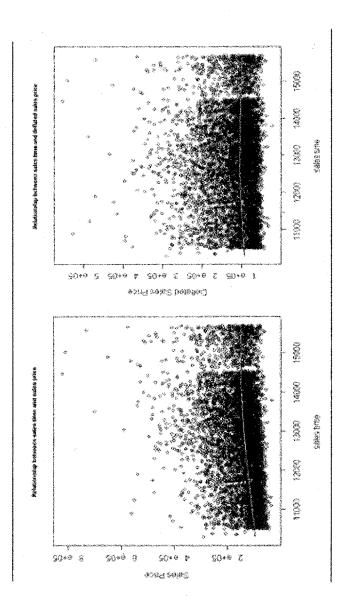
Figure 1: Property Prices between Suburbs



73

Pacific Rim Property Research Journal, Vol 13, No 1

Figure 2: Property Price versus Time



Pacific Rim Property Research Journal, Vol 13, No 1

Property price versus time

Figure 2 shows that property prices, both before and after CPI-adjustment, generally increase and then level out in the last period. However, after deflating the sales prices the increase is much less. Regardless, this indicates that time has a significant effect on property price, as would be expected.

The next section outlines the results from the multiple regression analyses. A comparison of these results to the results from the earlier study is covered in Section 5.

EMPIRICAL RESULTS

This section presents the results from the various multiple regression models used to quantify the relationship between the response variable, property sales price, and the explanatory variables.

The model of choice is one that best represents the relationships between the variables and has a small variance and unbiased parameters. Various models were tested and the results are described in the next section. The following statistics were used to help select the most appropriate model: the adjusted coefficient of determination (adjusted R²); the standard error of the regression equation; the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) statistics; t-test of significance of the coefficients and F-statistic.

Significance of the variables and the equation with "TOWER" included

As hedonic price estimates can vary significantly across different functional forms, various commonly used functional forms were examined to determine the model specification that best describes the relationship between price and the independent variables. It was found that the best result was obtained from using the log of DSLNETX, the log of both LANDAX and MATFAX, and the linear form of all the dummy variables.

In the semi-logarithmic equation, the interpretation of the dummy variable coefficients involves the use of the formula: $100(e^{bn} - 1)$, where bn is the dummy variable coefficient (Halvorsen & Palmquist, 1980).

A multiple regression model was fitted to the data that included the variable "TOWER". This was done using the statistical software "R" to check whether or not the presence of a CPBS has an affect on property sales prices. The resulting model included all the available variables as follows:

$$\begin{split} \text{Log (DSLNETX)} &= \alpha + \beta_1 \text{ CATGYX2} + \beta_2 \text{ CATGYX4} + \ \beta_3 \text{ NEWAGE} \\ &+ \beta_4 \log(\text{LANDAX}) + \beta_5 \log(\text{MATFAX}) + \ \beta_6 \text{ SLDATX1} \\ &+ \beta_7 \text{ WALLCNX} + \beta_8 \text{ ROOFCNX} + \beta_9 \text{ SUBURB} \end{split}$$

Tower

The regression output in Appendix I shows that most of the coefficients are significant except the majority of wall materials (WALLCNX) and purpose-built rental flats (CATGYX2). Only the wall material of iron (WALLCNXI) was significant in the model. The coefficient of determination (R²) indicates that approximately 83.5% of the variation in sale price is explained by the variation in the independent variable set. Further, the p-value of the F-statistic is approximately 0 indicating the good fit of the data.

The *TOWER* coefficient is -0.0229, and the p-value is 0.0088, which indicates a negative relationship between the presence of a CPBS and price. Quantitatively, the presence of a CPBS decreases price by 2.3%, (1- $e^{-0.0229}$), when other explanatory variables are held constant. Although this percentage is small, a CPBS does have a significant negative influence on price.

The most significant variables were log (MATFAX) (log of total floor area) and NEWAGE. The positive log of total floor area shows that prices increase with increasing size while the negative age coefficient shows that prices decrease the greater the age of a home is. The regression coefficient on log MATFAX is 0.632, which indicates that, on average, a 10% increase in floor area (m²) will generate a 6.32% increase in price. The negative coefficient for NEWAGE indicates that, when all the other variables are held constant, for each additional year of age the price would decrease by $e^{0.00422} \approx 1.00422 (0.42\%)$.

Another strongly significant variable was *SLDATX*. Though very small, the positive coefficient indicates an appreciation of sale price over time even after the CPI adjustment.

General model including the variable "Distance"

A multiple regression model was fitted to the data that included the variable inv.dist to determine whether or not distance to a CPBS has an affect on price. The model is as follows:

$$\begin{split} \text{Log (DSLNETX)} &= \alpha + \beta_1 \text{ CATGYX2} + \beta_2 \text{ CATGYX4} + \ \beta_3 \text{ NEWAGE} \\ &+ \beta_4 \log(\text{LANDAX}) + \beta_5 \log(\text{MATFAX}) + \ \beta_6 \text{ SLDATX1} \\ &+ \beta_7 \text{ WALLCNX} + \beta_8 \text{ ROOFCNX} + \beta_9 \text{ SUBURB} + \beta_{10} \text{ inv. dist} \end{split}$$

This model also fitted the data very well, explaining 83.2% of the variability in sales price. All explanatory variables have significant coefficients except for wall materials (*WALLCNX*) (see Appendix II for the regression output).

The variable *inv.dist*, which measures the effect of distance on price, has a negative coefficient of -0.368, with a significant p-value of 0.0082, indicating there is strong evidence that distance has a significant effect on the logged sales price. Thus, logged sales price decreases as the inverse of the squared root distance between a CPBS and a property increases. In other words, price decreases as the distance between a CPBS and a property decreases, when all other explanatory variables are held constant. For example, when the distance between a CPBS and a property is

50 meters, the price of the property will drop by 5.07% (1- $e^{-0.368 \times \frac{1}{\sqrt{50}}}$). Distance has a larger negative effect on price than does the mere presence of a CPBS, as indicated in the previous model. Table 4 gives the magnitude of the decrease in property prices for the different distances between the CPBS and the properties.

Table 4: Decreases in property prices with increasing distance

Distance (meters)	Decrease in price (%)	Increase in distance
10	10.99	-
50	5.07	40
100	3.61	50
200	2.57	100
500	1.63	300

From Table 4, it appears that the effect on property price is negligible after 300 meters from a CPBS. This is similar to the findings of other proximity studies (see for example, Hamilton and Schwann (1995) and Strand and Vagnes (2001)).

As in the previous model, the most significant variables were log (MATFAX) (log of total floor area) and NEWAGE. Further, the variable coefficients are very similar to the previous model. The regression coefficient on log MATFAX is 0.624, which indicates that, on average, a 10% increase in floor area (m^2) will generate a 6.24% increase in price. The negative coefficient for NEWAGE indicates that, when all the other variables are held constant, for each additional year of age, the price would decrease by $e^{0.00419} \approx 1.0042$ (0.42%).

A multiple regression model was fitted that includes the variable *DIST*, a categorical distance variable, taking values 0, 1, 2, 3. Each number represents a predetermined circular distance ring around the CPBS. The model is the same as previously used but includes *DIST* instead of *inv.dist* or *TOWER*. The output of this model is shown in Appendix III.

Similar to the results from the model that included the variable "TOWER", the output for this model shows that most of the coefficients are significant except wall materials (WALLCNX) and purpose-built rental flats (CATGYX2R). The coefficient of determination (R²) indicates that approximately 83.5% of the variation in sale price is explained by the variation in the independent variable set.

The first two categories of the distance variable are strongly significant in the model. However, category 3 which represents a distance greater than 600 meters from a property to a CPBS is insignificant in the model. Prices of properties located between 0 and 300 meters from a CPBS decrease by 2.74% (1- e^{-0.0278}) while those located between 300 and 600 meters from a CPBS will decrease by 2.87% (1- e^{-0.0291}) relative to properties that sold prior to the CPBS being built when holding other explanatory variables constant. Thus, a CPBS has a significant, albeit minimal, effect on prices of property located within 600 meters of a CPBS.

As with the previous two models the most significant variables were log (MATFAX) (log of total floor area) and NEWAGE. The regression coefficients of each variable are also very similar to those obtained in the previous models.

CASE MODEL - ST. ALBANS

The discussion above relates to the results from analysis of the whole dataset. These indicate that CPBSs have a significant, but minimal, effect on the prices of proximate properties. However, differences might exist in the effect that CPBSs have on property prices between suburbs, since the distribution of the property sales prices is quite different in each. Accordingly, this section focuses on investigating whether or not the presence of a CPBS has an impact on property prices within each of the suburbs.

In St Albans, 1069 properties sold and a large number of these (864) sold after the CPBS was built. Three separate multiple regression models were fitted to the data, one with each variable *TOWER*, *inv.dist* and *DIST* included, respectively. As the regression coefficients of each variable are very similar to those obtained in the previous models only the coefficients of the variables of interest, *TOWER*, *inv.dist* and *DIST*, are shown below in Table 5.

Table 5: Coefficients of TOWER, inv. dist and DIST for St. Albans

Variable:	TOWER	Inv.dist	DIST1	DIST 2	DIST 3
Coefficients	1.48e-01	8.99e-01	1.45e-01	1.53e-01	1.44e-01
P-value	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***

The variables TOWER, inv.dist and DIST are significant in the respective models. However, surprisingly, the coefficients of each variable are positive indicating that a CPBS in St Albans has a positive effect on the property prices. All things being equal, with the variable TOWER included in the model, the presence of the CPBS will increase property values by 16% ($e^{0.148}$).

This was a similar result to that obtained in the earlier study that did not include a distance variable. In that study sales prices increased by 12%. An explanation given for this was that the *TOWER* was built in 1994 before the negative media attention to the adverse health affects from CPBSs. Alternatively, there is a collinearity problem in the current St Albans model. The variable *SLDATXI* which measures the time effect on the property prices was not significant in the model, and possibly the variable *TOWER* may include some of these time effects.

When the variable *inv. dist* is included in the model, the results indicate that as the *inv. dist* increases, the logged property price in St Albans also increases when holding other explanatory variables constant. That is to say, as the distance between the CPBS and the property decreases, then the property values increase when holding the other variables constant. For example, at 50 meters distance, the

property prices increase by 13.56% ($e^{0.899 \times \frac{1}{\sqrt{50}}}$ - 1) and by 9.41% at 100 meters.

When the variable *DIST* is included in the model, all levels of the variable have significant and positive coefficients. Prices will increase by 15.6% ($e^{0.145}$) when the property is located in the range of zero to 300 meters from the CPBS, and by 16.5% ($e^{0.153}$) and 15.5% ($e^{0.144}$) when the property is located between 300 and 600 meters and more than 600 meters from a CPBS, respectively. Since *DIST1*, *DIST2*, *DIST3* have similar coefficients, this is very like the model that included the variable TOWER.

St Albans is an up-market Christchurch suburb, with higher property prices due to being located near public transportation, good educational facilities, parks, etc and it has better socio-economic characteristics than other suburbs. Thus, the variable "distance" might include some of these influences, in addition to the effect of distance to a CPBS. Alternatively, it is possible that as it is a more affluent suburb more homeowners may own and use cell-phones than homeowners in other suburbs, and hence they may prefer the better cell phone coverage that they would get by being near a CPBS.

CASE MODEL - BECKENHAM

The same functional form used in the previous models was applied to Beckenham to test the effect that the various variables *TOWER*, *inv.dist* and *DIST* have on sales price. In Beckenham, 1172 properties sold and 209 of these sold after the CPBS

was built, Three separate multiple regression models were fitted to the data, one with each variable *TOWER*, *inv.dist* and *DIST* included, respectively. As the regression coefficients of each variable are very similar to those obtained in the previous models only the coefficients of the variables of interest, *TOWER*, *inv.dist* and *DIST*, are shown in Table 6, below.

Table 6: Coefficients of TOWER, inv. dist and DIST for Beckenham

Variable:	TOWER	Inv.dist	DIST1	DIST 2	DIST 3
Coefficients	-1.81e-01	-2.85e+00	-1.74e-01	-1.74e-01	-2.03e-01
P-value	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***

In Beckenham, TOWER, inv.dist and DIST are significant in the respective models. All of them have a negative relationship with the logged sales price. With the variable TOWER included in the model, the presence of the CPBS will decrease property price by 16.56% $(1 - e^{-0.181})$ when holding other explanatory variables constant.

When the variable *inv.dist* is included in the model, the results indicate that as the *inv.dist* increases one unit, the logged property price will decrease 2.85 units. For example, in Beckenham, the minimum distance of a home to a CPBS is about 97 meters, the property prices corresponding to this distance will decrease by 25.13%

 $(1 - e^{-2.85 \times \frac{1}{\sqrt{97}}})$ when holding other variables constant. This is a surprisingly large decrease in price.

The output of the model with variable *DIST* included shows that where the distance of the property from the CPBS is between 0 and 300 meters or 300 and 600 meters, the price will decrease by 15.9% (1- e^{-0.174}) relative to properties that sold before the CPBS was built. If the distance is greater than 600 meters, the price will decrease by 18.37% (1- e^{-0.203}) relative to properties that sold before the CPBS was built. Thus, there is a greater negative impact on price when the distance between the property and the CPBS is greater. This result appears to be inconsistent with expectation and the results from the previous models. It is possible that the variable *inv. dist* not only measures the effect of CPBSs on sales price, but also reflects the effect of other influences not included in the model.

CASE MODEL - BISHOPDALE

In Bishopdale, 959 properties sold and only 38 of these sold after the CPBS was built. Despite this data discrepancy before and after the CPBS was built, three

separate multiple regression models were fitted to the data, one with each variable *TOWER*, *inv. dist* and *DIST* included, respectively. The results from the separate models indicate that in Bishopdale the *TOWER* and two separate distance variables are significant in the models and all have a negative relationship with the logged sales price. The coefficients of the variables of interest, *TOWER*, *inv. dist* and *DIST*, are shown below in Table 7.

Table 7: Coefficients of TOWER, inv. dist and DIST for Bishopdale

	TOWER	Inv.dist	DIST1	DIST 2
Coefficients	-9.86e-02	-1.62e+00	-1.34e-01	-9.18e-02
P-value	0.0000***	0.0000***	0.0000***	0.0000***

The presence of the CPBS will decrease the sales price by 9.39% (1- $e^{-0.0986}$) when holding other factors constant. As *inv.dist* is increased by one unit, the logged property price will decrease by 1.62 units when holding other variables constant. For example, property prices at 50 meters distance from the CPBS will decrease by

20.48% (1 -
$$e^{-1.62 \times \frac{1}{\sqrt{50}}}$$
) and by 15% at 100 meters.

The coefficients from the model incorporating the categorical distance variable look reasonable. However, no properties sold that were located further than 600 meters from the CPBS so there were only two levels for the categorical distance variable. When holding other explanatory variables constant property prices will decrease by 12.54% (1- e -0.134) when a property is located between 0 and 300 meters of a CPBS. Prices will decrease by 8.96% (1- e -0.0939) when a home is located between 300 and 600 meters of a CPBS.

CASE MODEL - PAPANUI

In Papanui, 1079 properties sold and 79 of these sold after the CPBS was built. The results from the three separate models indicate that all variables are significant. The coefficients are listed in Table 8.

Table 8: Coefficients of TOWER, inv. dist and DIST for Papanui

	TOWER	Inv.dist	DIST1	DIST 2	DIST 3
Coefficients	-8.17e-02	-2.24e+00	-7.02e-03	-1.55e-01	-6.70e-02
P-value	0.00142 **	0.0000***	0.93766	0.00147 **	0.01888 *

In Papanui, when *TOWER* is included in the model, the presence of the CPBS will decrease sales prices by 7.85% (1- e^{-0.0817}) when holding other variables constant. Property sales prices will decrease as the variable *inv. dist* increases, or, in other words, sales prices will decrease as the distance between the CPBS and the property decreases. For example, in Papanui, the minimum distance between the CPBS and the property is about 177 meters, so prices will decrease by a factor of

$$15.50\% (1 - e^{-2.24 \times \frac{1}{\sqrt{177}}}).$$

However, in the model that includes the categorical distance properties located between 0 and 300 meters do not sell for significantly different prices when compared to the properties that sold before the CPBS was built, which is at odds to the previous result from the model including *inv.dist*. The reason for this is due to there being only 3 property sales located within 0 to 300 meters of a CPBS, so there are insufficient observations in this category for a valid statistical comparison. In the other two distance categories, the property sales prices decrease by 14.36% (1- e -0.1.55) and 6.48% (1- e -0.067), respectively. These sizes of the decrease in the property values due to the effect by the CPBS seem reasonable.

DISCUSSION AND COMPARISON WITH THE PREVIOUS STUDY

The analysis showed that the most significant variables and their effect on price were similar between the four suburbs: St. Albans, Beckenham, Papanui, and Bishopdale. This indicates the relative stability of the coefficients between each model. The overall results indicate that the presence of a CPBS has a significant and negative effect on property prices. This effect is not very strong when the variable TOWER is included in the model fitted to the entire dataset. However, the effect in each suburb is quite pronounced. Table 9 summarizes the results and includes the results from the previous study (shown in brackets and italics) for comparison.

Table 9: Coefficients of TOWER, inv.dist and DIST

Model:		TOWER (Previous)	Inv. dist	DIST1	DIST 2	DIST 3
All Suburbs	Coefficients	-2.29e-02	-3.68e-01	-2.78e-02	-2.91e-02	-3.98e-03
	Value Effects	-2.3%	50m @ -5,07% 100m@ -3.61%	-2.7%	-2.87%	Insignif.
I. St Albans 1994	Coefficients	1.48e-01	8.99e-01	1.45e-01	1.53e-01	1,44e-01
	Value Effects	+16% (+12%)	50m@+13.6% 100m@+9.4%	+15.6%	+16.5%	+15,5%
4.Beckenham 2000	Coefficients	-1.81e-01	-2.85e+00	-1.74e-01	-1.74e-01	-2.03e-01
	Value Effects	-16.56% (-20.7%)	97m @-25,13%	-15.9%	-15.9%	-18.37%
3.Bishopdale 1994	Coefficients	-9.86e-02	-1.62e+00	-1.34e-01	-9.18e-02	
	Value Effects	-9.39% (insignif.)	50m @-20,4% 100m@ -15%	-12.54%	-8.96%	
2. Papanui 2000	Coefficients	-8.17e-02	-2.24e+00	-7.02e-03	-1.55e-01	-6.70e-02
	Value Effects	-7.85% (-21%)	177m @-15.5%	Insignif.	-14.36%	-6.48%

In terms of the effect that proximity to a CPBS has on price, the overall results indicate that this is significant and negative. Generally, the closer to the CPBS a property is the greater the decrease in price. However, there are differences in the results between suburbs. St Albans actually shows the reverse effect with prices increasing closer to the CPBS. Some explanations for this are offered next.

In the previous study, it was suggested that the difference in results between suburbs was due to the date that the towers were constructed. The effect of TOWER on price was similar in the two suburbs where the towers were built in the year 2000 (Papanui and Beckenham). It was suggested that this may be due to the much greater media publicity given to CPBSs after the two legal cases in Christchurch in 1996 and 1999 respectively. The other two suburbs that indicated a tower was either insignificant (Bishopdale) or increased prices by around 12% (St Albans), had towers built in them in 1994, prior to the media attention.

However, in the current study, the results for Bishopdale were similar to the other two suburbs that showed a negative effect on price even though the CPBS in Bishopdale was built in 1994 prior to the adverse publicity. This result brings into question the validity of the above hypothesis. Yet the explanation may still hold when considering the number of sales before and after the CPBS was built in each suburb. For example, in Bishopdale only 38 properties (3.8% of total sales for the suburb) sold after the CPBS was built compared to 6.8% in Papanui, 15.15% in Beckenham and 44.68% in St Albans. This low number of sales may mean that the results are not fully representative of all properties that sold in Bishopdale after the CPBS was built.

Another explanation for the difference in results between suburbs relates to the differences in the social structure of each neighbourhood. St Albans has the highest

socio-economic characteristics, followed by Papanui and Bishopdale. Beckenham has the lowest socio-economic characteristics. This pattern follows the order of value effect on sales price of the presence of a CPBS. The better suburbs are less affected (+16% in St Albans and -7.85% in Papanui) compared to the lower socio-economic areas which have the greatest negative impact on prices from proximity to a CPBS (-9.39% in Bishopdale and -20.7% in Beckenham). As suggested earlier, the better suburbs may want to be closer to the CPBS for the better cell phone coverage this affords (assuming a higher percentage of the more affluent population will use a cell phone) and so do not perceive these so negatively, particularly prior to the media attention to CPBSs. Conversely, the CPBSs in the more affluent suburbs may be better concealed from view.

The expectation was that the negative effect on price of proximity to a CPBS would be greater the closer a property was to a CPBS, reducing with distance from it. While this was the case for two suburbs (Bishopdale and Papanui) the results were mixed and may be explained by the differences in how visible the CPBS is from each property. This will be affected by topographical differences, objects such as trees and buildings that may conceal it and the height and design of the CPBS itself. Thus, the distance variables are an imperfect measure of the effect of living near a CPBS.

LIMITATIONS AND AREAS FOR FURTHER STUDY

The main limitation affecting this survey was in finding case study areas where CPBSs were highly visible from the majority of homes. This deficit was very difficult to control for. Thus, caution must be used in making generalizations from the study or applying the results directly to other similar studies or valuation assignments. Factors that could affect results are the style and appearance of the CPBS, how visible it is to residents, and the socio-economic make-up of the resident population.

It must be kept in mind that these results are the product of only one case study carried out in a specific area (Christchurch) at a specific time (2003/2004). The above results indicate that value-effects from CPBSs can vary over time as market participant's perceptions change due to increased public awareness regarding the potential averse health and other effects of living near a CPBS. To confirm this, many similar studies, of similar design to allow comparison between them, need to be conducted over time and the results made public.

With the sharing of results from similar studies, a global database could be developed to assist valuers in determining the perceived level of risk associated with CPBSs and other similar structures from geographically and socioeconomically diverse areas. This would aid in the valuation of property affected by these structures, anywhere in the world.

SUMMARY AND CONCLUSION

This research was a refinement of a previous study that looked at the effect that the presence of a CPBS has on residential property prices (see Bond and Wang, 1995). The current study looked more specifically at distance impacts by investigating how proximity to a CPBS affects the price of such properties. It did this by focusing on four case study neighbourhoods in Christchurch, NZ, and analyzing property sales prices both before and after a CPBS was built in each suburb using multiple regression analysis within a hedonic pricing framework.

The results indicate that property prices decrease by around 15% after a CPBS is built. This effect generally reduces with distance from the CPBS and is almost negligible after about 300 meters. However, this result varied between neighbourhoods, with a positive impact on price being recorded in one neighbourhood, possibly due to the CPBS being built before there was any negative media publicity towards CPBSs and that the CPBS is better concealed than in the other neighbourhoods.

REFERENCES

AGNIR (2003). Health effects from radiofrequency electromagnetic fields. Report of an Advisory Group on Non-ionising Radiation. <u>Doc NRPB</u>, 14(2), 1-177.

Bond, S.G. and Wang, K. (2005). "The Impact of Cell Phone Towers on House Prices in Residential Neighbourhoods", *The Appraisal Journal*, Volume LXXIII, No.3, pp.256-277.

Bond, S.G., Beamish, K. (2005). "Cellular Phone Towers: Perceived Impact on Residents and Property Values", *Pacific Rim Property Research Journal*, Vol. 11, no. 2, pp. 158-177.

Bond, S.G. & Hopkins, J. (2000)."The Impact of Transmission Lines on Residential Property Values: Results of a Case Study in a Suburb of Wellington, New Zealand", Pacific *Rim Property Research Journal*, Vol.6, No. 2, pp.52-60.

Chen, G., Upham, B.L., Wei Sun, Chang, C., Rothwell, E.J., Chen, K., Yamasaki, H., and Trosko, J.E. (2000), "Effect of Electromagnetic Field Exposure on Chemically Induced Differentiation of Friend Erythroleukemia Cells", *Environ Health Perspect*. Vol.108:967-972.

Cherry, N. (2000), "Health Effects Associated with Mobil Base Stations in Communities: The Need for Health Studies," Environmental Management and Design Division, Lincoln University, June 8. Available from: http://pages.britishlibrary.net/orange/cherryonbasestations.htm.

Christchurch City Council website. Available from: www.ccc.govt.nz/index.asp

Colwell, P. (1990), "Power Lines and Land Value", *Journal of Real Estate Research*, Vol. 5, No. 1, Spring.

Colwell, P., Bradford, C., Watkins, C. and Leishman, C. (2003), "Estimating the Impact of Environmental Contamination on Condo prices: A hybrid repeat-sale/hedonic approach", June, *European Real Estate Society Conference*, Helsinki, Finland.

Court, A.T. (1939). Hedonic Price Indexes with Automotive Examples, in: <u>The Dynamics of Automobile Demand</u>. General Motors, New York.

Des Rosiers, F. (2002), "Power Lines, Visual Encumbrance and House Values: A Microspatial Approach to Impact Measurement", *Journal of Real Estate Research*, Vol.23, No.3, pp. 275 – 301.

Flynn, J., MacGregor, D.G., Hunsperger, W., Mertz, C.K., Johnson, S.M. (2004), "Survey Approach for Demonstrating Stigma Effects in Property Value Litigation", *The Appraisal Journal*, 72 (1): 35-45.

Freeman, A. M. I. (1979), <u>The Benefits of Environmental Improvement</u>, John Hopkins Press, Baltimore, MD.

Griliches, Z. (ed.) (1971). <u>Price Indexes and Quality Change</u>. Harvard University Press, Cambridge, Mass.

Hamilton, S. and Schwann, G. (1995), "Do High Voltage Electric Transmission Lines Affect Property Value?" *Land Economics*, Vol.71, No. 4, pp. 436-444.

Halvorsen, R. and Palmquist, R. (1980), "The Interpretation of Dummy Variables in Semi-logarithmic Equations", *American Economic Review*, Vol. 70, No. 3, pp. 474-475.

Hardell, L., Mild, K.H., Carlberg, M. (2003), "Further Aspects On Cellular and Cordless Telephones and Brain Tumors", *International Journal of Oncology*, Vol.22(2), pp399-407.

Hite. D, Chern, W.S., Hitzhusen, F. Randall, A. (2001), "Property Value Impacts of an Environmental Dis-amenity". *Journal of Real Estate Finance and Economics*, Vol.22:2/3, pp.185-202.

Kinnard, W. N., Geckler, M. B., & Dickey, S. A. (1994), 'Fear (as a measure of damages) strikes out: two case studies comparisons of actual market behaviour

with opinion survey research', Paper presented at *The Tenth Annual American Real Estate Society Conference*, April, Santa Barbara, California.

Kinnard, Jr., W.N. DeLoittie, J.W. Geckler, M.B., Noble, B.H. (1995). "The Impact of Widespread, Long-term Soil Contamination on Residential Property Values: A Case Study," Paper presented at the *American Real Estate Society Conference*, Hilton Head, South Carolina.

Michelozzi, P., Capon, A., Kirchmayer, U., Forastiere, F., Biggeri, A., Barca, A., & Perucci, C.A. (2002), "Adult and Childhood Leukemia near a High-Power Radio Station in Rome, Italy", *American Journal of Epidemiology*, Vol.155, pp.1096-1103.

McCluskey, J.J. & Rausser, G. C. (2000), "Stigmatized Asset Values: Is it Temporary or Permanent?" Research paper: Department of Agricultural Economics, Washington State University, WA.

Moulder, J.E., Foster, K.E., Erdreich, L.S., & McNamee, J.P. (2005), "Mobile Phones, Mobile Phone Base Stations, and Cancer: A Review", *International Journal of Radiation Biology*, Vol. 81, pp.189-203.

Reichert, A.J. (1997)" Impact of a Toxic Waste Superfund Site on Property Values", *The Appraisal Journal*, Vol. 65, pp. 381-392.

Rosen, S. (1974), "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition", *Journal of Political Economy*, Vol. 82, pp. 34-55.

Siemens, H. (2003), "Stigma of Contaminated Land: Difficult to Tackle", *The Appraisal Journal*, Vol. 71, pp.121-127.

Simons, R.A. Winson-Geideman, K. and Mikelbank, B. (2001), "The Effects of an Oil Pipeline Rupture on Single-Family House Prices Along the Patuxent River in Maryland", Paper presented at *The American Real Estate Society conference*, April, Coeur d'Alene, Idaho.

Slovic, P. (1992), "Perceptions of risk: Reflections on the psychometric paradigm", in *Social Theories of Risk*, eds. S. Krimsky & D. Golding, Praeger, Westport, Connecticut, pp. 117-152.

Strand, J. and Vagnes, M. (2001), "The Relationship Between Property Values and Railroad Proximity: A Study Based on Hedonic Prices and Real Estate Brokers' Appraisals", *Transportation*, Vol. 28, pp 137.

Szmigielski, S. and Sobiczewska, E. (2000). "Cellular Phone Systems and Human Health – Problems with Risk Perception and Communication", *Environmental Management and Health*, Vol. 11, pp 352-368.

Appendix I-Regression Model with "TOWER"

Variable	Estimate	Std. Error		value Pr(> t)
(Intercept)	8.60e+00	1,40e-01	61.24	0.0000***
CATGYX2D	6.66e-02	2.54e-02	2.62	0.00882 **
CATGYX2F	-7.01e-02	2.65e-02	-2.64	0.00826 **
CATGYX2R	7.95e-02	4.15e-02	1.92	0.05546 .
CATGYX4B	-1.41e-01	7.41e-03	-19.07	0.0000***
CATGYX4C	-1.88e-01	1.86e-02	-10.09	0.0000***
NEWAGE	-4.22e-03	1.11e-04	-37.95	0.0000***
log(LANDAX)	1,01e-01	6.42e-03	15.73	0.0000***
log(MATFAX)	6.32e-01	8.50e-03	74.38	0.0000***
SLDATX1	2.42e-05	1.74e-06	13.88	0.0000***
WALLCNXB	5.04e-02	2.86e-02	1.76	0.07768 .
WALLCNXC	2.05e-02	2.86e-02	0.72	0.47301
WALLCNXF	-3.54e-02	3.18e-02	-1.11	0.26636
WALLCNXG	1.75e-01	1.26e-01	1.39	0.16527
WALLCNXI	2.47e-01	8.27e-02	2.99	0.00280 **
WALLCNXO	4.70e-02	8.32e-02	0.56	0.57268
WALLCNXP	-1.94e-02	3.72e-02	-0.52	0,60233
WALLCNXR	2.51e-02	2.88e-02	0.87	0.38365
WALLCNXS	5.03e-02	3.39e-02	1.49	0.13752
WALLCNXW	4.60e-02	2.85e-02	1.61	0.10658
WALLCNXX	7.78e-03	3.00e-02	0.26	0.79553
ROOFCNXI	4.63e-01	1.24e-01	3.74	0.0000***
ROOFCNXO	3.68e-01	1.24e-01	2.96	0.00311 **
ROOFCNXT	4.26e-01	1.24e-01	3.44	0.0000***
SUBURBAvonhe	-2.61e-01	1.07e-02	-24.26	0.0000***
SUBURBBromle	-5.94e-01	1.13e-02	-52.32	0.0000***
SUBURBBeckenham	-4.05e-01	9.09e-03	-44.56	0.0000***
SUBURBBishop	-3.66e-01	1.07e-02	-34.32	0.0000***
SUBURBIlam	-1.65e-01	1.18e-02	-13.94	0.0000***
SUBURBPapanui	-4.37e-01	9.94e-03	-44.01	0.0000***
SUBURBLinwoo	-6.05e-01	1.08e-02	-55.80	0.0000***
SUBURBUpRic	-2.09e-01	1.07e-02	-19.52	0.0000***
SUBURBSpreyd	-4.54e-01	1.05e-02	-43.05	0.0000***
TOWER	-2.29e-02	8.72e-03	-2.62	0.00880 **

Signif. codes: 0 **** 0.001 *** 0.01 ** 0.05 ... 0.1 * 1
Residual standard error: 0.173 on 8659 degrees of freedom
Multiple R-Squared: 0.835, Adjusted R-squared: 0.834
F-statistic: 1.33e+03 on 33 and 8659 DF, p-value: <2e-16

Appendix II - Regression Model with "inv.dist"

Variable	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	8.65e+00	1.42e-01	61.06	0.0000***
CATGYX2D	6.40e-02	2.57e-02	2.49	0.01268 *
CATGYX2F	-7.49e-02	2.68e-02	-2.80	0.00517 **
CATGYX2R	8.32e-02	4.19e-02	1.99	0.04687 *
CATGYX4B	-1.45e-01	7.46e-03	-19.46	0.0000***
CATGYX4C	-2.02e-01	1.87e-02	-10.79	0.0000***
NEWAGE	-4.19e-03	1.12e-04	-37.38	0.0000***
log(LANDAX)	1.01e-01	6.46e-03	15.60	0.0000***
log(MATFAX)	6.24e-01	8.52e-03	73,23	0.0000***
SLDATXI	2.41e-05	1.70e-06	14.17	0.0000***
WALLCNXB	5.19e-02	2.88e-02	1.80	0.07216.
WALLCNXC	2.19e-02	2.88e-02	0.76	0.44817
WALLCNXF	-3.39e-02	3.21e-02	-1.06	0.29112
WALLCNXG	1.78e-01	1.28e-01	1.40	0.16180
WALLCNXI	1.13e-02	7.72e-02	0.15	0.88380
WALLCNXO	4.83e-02	8.40e-02	0.58	0.56530
WALLCNXP	-1.05e-02	3.76e-02	-0.28	0.78084
WALLCNXR	2.46e-02	2.91e-02	0.84	0.39849
WALLCNXS	5.20e-02	3.42e-02	1.52	0.12774
WALLCNXW	4.68e-02	2.88e-02	1.63	0.10371
WALLCNXX	1.03e-02	3.03e-02	0.34	0.73478
ROOFCNXI	4.54e-01	1.25e-01	3.64	0.0000***
ROOFCNXO	3.59e-01	1.26e-01	2.86	0.00425 **
ROOFCNXT	4.18e-01	1.25e-01	3.34	0.0000***
SUBURBAvonhe	-2.58e-01	1.04e-02	-24.85	0.0000***
SUBURBBromle	-5.91e-01	1.10e-02	-53.87	0.0000***
SUBURBBeckenham	-4.04e-01	8.84e-03	-45.68	0.0000***
SUBURBBishop	-3.64e-01	1.03e-02	-35.21	0.0000***
SUBURBllam	-1.61e-01	1.15e-02	-14.01	0.0000***
SUBURBPapanui	-4.36e-01	9.68e-03	-44.98	0.0000***
SUBURBLinwoo	-6.05e-01	1.05e-02	-57.74	0.0000***
SUBURBUpRic	-2.05e-01	1.03e-02	-19.88	0.0000***
SUBURBSpreyd	-4.51e-01	1.01e-02	-44.46	0.0000***
inv.dist	-3.68e-01	1.39e-01	-2.64	0.00821 **

Signif. codes: 0 **** 0.001 *** 0.01 ** 0.05 . 0.1 1 Residual standard error: 0.175 on 8662 degrees of freedom Multiple R-Squared: 0.832, Adjusted R-squared: 0.832 F-statistic: 1.3e+03 on 33 and 8662 DF, p-value: <2e-16

Appendix III - Regression Model with "DIST"

Variable	Estimate	Std. Error	t values	Pr(> t)
(Intercept)	8.61e+00	1.40e-01	61.29	0.0000***
CATGYX2D	6.68e-02	2.54e-02	2.63	0.00865 **
CATGYX2F	-6.95e-02	2.65e-02	-2.62	0.00882 **
CATGYX2R	7.67e-02	4.15e-02	1,85	0.06470 .
CATGYX4B	-1.41e-01	7.41e-03	-19.05	0.0000***
CATGYX4C	-1.88e-01	1.86e-02	-10.10	0.0000***
NEWAGE	-4.23e-03	1.11e-04	-38.05	0.0000***
log(LANDAX)	1.00e-01	6.42e-03	15.61	0.0000***
log(MATFAX)	6.32e-01	8.49e-03	74.36	0.0000***
SLDATX1	2.40e-05	1.74e-06	13.77	0.0000***
WALLCNXB	4.66e-02	2.86e-02	1.63	0.10266
WALLCNXC	1,67e-02	2.86e-02	0.58	0,56016
WALLCNXF	-3.98e-02	3.18e-02	-1.25	0.21109
WALLCNXG	1.73e-01	1.26e-01	1.37	0.17016
WALLCNXI	2.52e-01	8.27e-02	3.05	0.00233 **
WALLCNXO	4.88e-02	8.32e-02	0.59	0.55760
WALLCNXP	-1.86e-02	3.75e-02	-0.50	0.62047
WALLCNXR	2.10e-02	2.88e-02	0.73	0.46684
WALLCNXS	4.48e-02	3.39e-02	1.32	0.18606
WALLCNXW	4.32e-02	2.85e-02	1.52	0.12979
WALLCNXX	5.34e-03	3.00e-02	0.18	0.85876
ROOFCNXI	4.62e-01	1.24e-01	3.73	0.0000***
ROOFCNXO	3.67e-01	1.24e-01	2.95	0.00323 **
ROOFCNXT	4.25e-01	1.24e-01	3.44	0.0000***
SUBURBAyonhe	-2.59e-01	1.08e-02	-24.12	0.0000***
SUBURBBromle	-5.93e-01	1.14e-02	-52.21	0.0000***
SUBURBBeckenham	-4.02e-01	9.12e-03	-44.11	0.0000***
SUBURBBishop	-3.63e-01	1.07e-02	-33.98	0.0000***
SUBURBIlam	-1.64e-01	1.18e-02	-13.84	0.0000***
SUBURBPapanui	-4.37e-01	9.95e-03	-43.90	0.0000***
SUBURBLinwoo	-6.04e-01	1.09e-02	-55.65	0.0000***
SUBURBUpRic	-2.08e-01	1.07e-02	-19.42	0.0000***
SUBURBSpreyd	-4.52e-01	1.05e-02	-42.88	0.0000***
DIST1	-2.78e-02	1.20e-02	-2.32	0.02030 *
DIST2	-2.91e-02	1.06e-02	-2.73	0.00630 **
DIST3	-3.98e-03	1.15e-02	-0.35	0.73008

Signif, codes: 0 **** 0.001 *** 0.01 ** 0.05 ** 0.1 **1
Residual standard error: 0.173 on 8657 degrees of freedom
Multiple R-Squared: 0.835, Adjusted R-squared: 0.835
F-statistic: 1.25e+03 on 35 and 8657 DF, p-values: <2e-16



The Impact of Cell **Phone Towers on House Prices in Residential** Neighborhoods

abstract

This article examines whether proximity to cellular phone towers has an impact on residential property values and the extent of any impact. First, a survey approach is used to examine how residents perceive living near cellular phone base stations (CPBSs) and how residents evaluate the impacts of CPBSs. Next, a market study attempts to confirm the perceived value impacts reported in the survey by analyzing actual property sales data. A multiple regression analysis in a hedonic pricing framework is used to measure the price impact of proximity to CPBSs. Both the survey and market sales analysis find that CPBSs have a negative impact on

by Sandy Bond, PhD, and Ko-Kang Wang

he introduction of cellular phone systems and the rapid increase in the number of users of cellular phones have increased exposure to electromagnetic fields (EMFs). Health consequences of long-term use of cellular phones are not known in detail, but available data indicates that development of nonspecific health symptoms is possible. Conversely, it appears health effects from cellular phone equipment (antennas and base stations) pose few, if any, known health hazards.²

A concern associated with cellular phone usage is the siting of cellular phone transmitting antennas (CPTAs) and cellular phone base stations (CPBSs). In New Zealand, CPBS sites are increasingly in demand as the major cellular phone companies there, Telecom and Vodafone, upgrade and extend their network coverage. This demand could provide the owner of a well-located property a yearly income for the siting of a CPBS.3 However, new technology that represents potential hazards to human health and safety may cause property values to diminish due to public perceptions of hazards. Media attention to the potential health hazards of CPBSs has spread concerns among the public, resulting in increased resistance to CPBS sites.

Some studies suggest a positive correlation between long-term exposure to the electromagnetic fields and certain types of cancer,4 yet other studies report inconclusive results on health effects.⁵ Notwithstanding the research results, media reports indicate that the extent of opposition from some property owners

the prices of houses in the

study areas.

Stanislaw Szmigielski and Elizbieta Sobiczewska, "Cellular Phone Systems and Human Health-Problems with Risk Perception and Communication," Environmental Management and Health 11, no. 4 (2000): 352-368.

Jerry R. Barnes, "Cellular Phones: Are They Safe?" Professional Safety 44, no. 12 (Dec. 1999): 20-23.

R. Williams, "Phone Zone—Renting Roof Space to Ma Bell," The Property Business 12 (April 2001): 6-7.

C. M. Krause et al., "Effects of Electromagnetic Field Emitted by Cellular Phones on the EEG During a Memory Task," Neuroreport 11, no. 4 (2000): 761-764.

^{5.} Independent Expert Group on Mobile Phones, Mobile Phones and Health (Report to the United Kingdom Govern-

affected by the siting of CPBSs remains strong.6 However, the extent to which such attitudes are reflected in lower property values for homes located near CPBSs is not known.

Understanding the impact of CPBSs on property values is important to telecommunications companies both for planning the siting of CPBSs and for determining likely opposition from property owners. Similarly, property appraisers need to understand the valuation implications of CPBSs when valuing CPBS-affected property. The owners of affected property also want to understand the magnitude of any effects, particularly if compensation claims or an award for damages are to be made based on any negative effects on value.

The research here uses a case study approach to determine residents' perceptions towards living near CPBSs in Christchurch, New Zealand, and to quantify these effects in monetary terms according to an increasing or decreasing percentage of property value. The case study uses both an opinion survey and an econometric analysis of sales transaction data. A comparison of the results can be used to help appraisers value affected property as well as to resolve compensation issues and damage claims in a quantitative way. Further, the results provide a potential source of information for government agencies in assessing the necessity for increased information pertaining to CPBSs.

The following provides a brief review of the cellular phone technology and relevant literature. Then, the next section describes the research procedure used, including descriptions of the case study and control areas. The results are then discussed, and the final section provides a summary and conclusion.

Cellular Telephone Technology⁷

Cellular (mobile) telephones are sophisticated twoway radios that use ultrahigh frequency (UHF) radio waves to communicate information. The information is passed between a mobile phone and a network of low-powered transceivers, called mobile phone sites or cell sites. As mobile sites are very low powered they serve only a limited geographic area (or "cell"), varying from a few hundred meters to several kilometers; they can handle only a limited number of calls at one time. When a mobile phone user on the move leaves one cell and enters another, the next site automatically takes over the call, allowing contact to be maintained.

When a mobile phone call is initiated, the phone connects to the network by using radio signals to communicate with the nearest mobile phone site. The mobile phone sites in a network are interlinked by cable or microwave beam, enabling phone calls to be passed from one cell to another automatically. A mobile phone site is typically made up of a mast with antennas connected to equipment stored in a cabinet. Power is fed into the cabinet by underground cable. The antennas are designed to transmit most of the signal away horizontally, or just below horizontal, rather than at steep angles to the ground.

Mobile phone sites can only accommodate a limited number of calls at any one time. When this limit is reached, the mobile phone signal is transferred to the next nearest site. If this site is full or is too far away, the call will fail.

Cell site capacity is a major issue for telecommunication companies. As the number of people using mobile phones grows, more and more cell sites are required to meet customer demand for reliable coverage. At the end of March 2002, Telecom had more than 1.3 million mobile phone customers and more than 750 mobile phone sites throughout New Zealand. Vodafone had over 1.1 million mobile phone customers.8 In areas, such as Auckland (the largest city in New Zealand, with close to a third of the NZ population), where almost complete coverage has been achieved, the main issue is ensuring that there is the capacity to handle the ever-increasing number of mobile phones and calls.

Locating Cellular Phone Sites

For cellular phone service providers, the main goals when locating cell sites are (1) finding a site that provides the best possible coverage in the area without causing interference with other cells, and (2) finding a site that causes the least amount of environmental impact on the surrounding area. Service providers usually attempt to locate cell sites on existing structures such as buildings, where antennas can be mounted on the roof to minimize the environmental impact. If this is not possible, a mast will need to be erected to support the antennas for the new cell site.

S. Fox, "Cell Phone Antenna Worries Family," East & Bays Courier, November 8, 2002, 1.

The information in this section was sourced from Telecom, http://www.telecom.co.nz; New Zealand Ministry for the Environment, http://www.mfe.govt.nz; and New Zealand Ministry of Health, http://www.moh.govt.nz.

Vodafone, "Cell Sites and the Environment," http://www.vodafone.co.nz/aboutus/vdfn_about_cellsites.pdf (accessed December 19, 2002) and "Mobile Phones and Health," http://www.vodafone.co.nz/aboutus/vdfn_about_health_and_safety.pdf (accessed December 19, 2002); and Telecom, "Mobile Phone Sites and Safety," http://www.telecom.co.nz/content/0,3900,27116-1536,00.html (accessed December 19, 2002).

Service providers prefer to locate cell sites in commercial or industrial areas due to the "resource consent" procedure required by the Resource Management Act 19919 for towers located in residential areas.

Despite the high level of demand for better cell phone coverage, the location of cell sites continues to be a contentious issue. The majority of people want better cell phone coverage where they live and work, but they do not want a site in their neighborhood. Thus, cell sites in or near residential areas are of particular concern. Concerns expressed usually relate to health, property values, and visual impact.10

In general, uncertainties in the assessment of health risks from base stations are presented and distributed in reports by organized groups of residents who protest against siting of base stations. When the media publishes these reports it amplifies the negative bias and raises public concerns. According to Covello, this leads to incorrect assessment of risks and threats by the public, with a tendency to overestimate risks from base stations and neglect risks from the use of cell phones.11

Assessment of Environmental Effects

Under the Resource Management Act 1991 (RMA), an assessment of environmental effects is required every time an application for resource consent is made. Information that must be provided includes "an assessment of any actual or potential effects that the activity may have on the environment, and the ways in which any adverse effects may be mitigated."12 An assessment of the environmental effects of cell sites would take into consideration such things as health and safety effects; visual effects; effects on the neighborhood; and interference with radio and television reception.

Radio Frequency and Microwave Emissions from CPBSs

According to the Ministry for the Environment, the factors that affect exposure to radiation are as follows:

 Distance. Increasing the distance from the emitting source decreases the radiation's strength and decreases the exposure.

- Transmitter power. The stronger the transmitter, the higher the exposure.
- · Directionality of the antenna. Increasing the amount of antennas pointing in a particular direction increases the transmitting power and increases the exposure.
- · Height of the antenna above the ground. Increasing the height of an antenna increases the distance from the antenna and decreases the exposure.
- · Local terrain. Increasing the intervening ridgelines decreases the exposure.15

The amount of radiofrequency power absorbed by the body (the dose) is measured in watts per kilogram, known as the specific absorption rate (SAR). The SAR depends on the power density in watts per square meter. The radio frequencies from cellular phone systems travel in a "line of sight." The antennas are designed to radiate energy horizontally so that only small amounts of radio frequencies are directed down to the ground. The greatest exposures are in front of the antenna so that near the base of these towers, exposure is minimal. Further, power density from the transmitter decreases rapidly as it moves away from the antenna. However, it should be noted that by initially walking away from the base, the exposure rises and then decreases again. The initial increase in exposure corresponds to the point where the lobe from the antenna beam intersects the ground.14

Health Effects

According to Szmigielski and Sobiczewska, the analogue phone system (using the 800–900 megahertz band) and digital phone system (using the 1850–1990 megahertz band) expose humans to electromagnetic field (EMF) emissions: radio frequency radiation (RF) and microwave radiation (MW), respectively. These two radiations are emitted from both cellular phones and CPBSs.15

For years cellular phone companies have assured the public that cell phones are safe. They state that the particular set of radiation parameters associated with cell phones is the same as any other ra-

^{9.} The Resource Management Act 1991 is the core of the legislation intended to help achieve sustainability in New Zealand; see http://www.mfe.govt.nz/ laws/rma.

^{10.} Szmigielski and Sobiczewska; and Barnes.

^{11.} Vincent T. Covello, "Risk Perception, Risk Communication, and EMF Exposure: Tools and Techniques for Communicating Risk Information," in Risk Perception, Risk Communication and Its Application to EMF Exposure: Proceedings of the World Health Organization and ICNIRP Conference, ed. R. Matthes, J. H. Bernhardt, M. H. Repucholi, 179-214 (Munich, Germany, May 1998).

^{12.} Section 88(4), (b), Resource Management Act 1991.

^{13.} Ministry for the Environment and Ministry of Health, National Guidelines for Managing the Effects of Radiofrequency Transmitters, available at http:// www.mfe.govt.nz and http://www.moh.govt.nz (accessed May 21, 2002).

^{14.} Ibid.: and Szmigielski and Sobiczewska.

^{15.} Szmiglelski and Sobiczewska.

dio signal. However, reported scientific evidence challenges this view and shows that cell phone radiation causes various effects, such as altered brain activity, memory loss, and fatigue.16

According to Cherry, there is also strong evidence to conclude that cell sites are risk factors for certain types of cancer, heart disease, neurological symptoms and other effects. 17 The main concerns related to EMF emissions from CPBSs are linked to the fact that radio frequency fields penetrate exposed tissues.

Public concern regarding both cell phones and CPBSs in many countries has led to establishment of independent expert groups to carry out detailed reviews of the research literature. Research on the health effects of exposures to RF are reviewed by, for instance, the NZ Radiation Laboratory, the World Health Organization, the International Commission on Non-Ionizing Radiation Protection (ICNIRP), the Royal Society of Canada, and the UK Independent Expert Group on Mobile Phones. The reviews conclude that there are no clearly established health effects for low levels of exposure. Such exposures typically occur in publicly accessible areas around radio frequency transmitters. However, there are questions over the delayed effects of exposure.

While present medical and epidemiological studies reveal weak association between health effects and low-level exposures of RF/MW fields, controversy remains among scientists, producers, and the general public. Negative media attention has fuelled the perception of uncertainty over the health effects from cell phone systems. Further scientific or technological information is needed to allay fears of the public about cell phone systems.

Radio Frequency Radiation Exposure Standards

International Standards. The reviews of research on the health effects of exposures to RF have helped establish exposure standards that limit RF exposures to a safe level. Most standards-including those set by the ICNIRP, the American National Standards Institute (ANSI), and New Zealand-are based on the most-adverse potential effects.

The 1998 ICNIRP guidelines have been accepted by the world's scientific and health communities; these guidelines are both consistent with other stated standards and published by a highly respected and independent scientific organization. The ICNIRP is responsible for providing guidance and advice on the health hazards of nonionizing radiation for the World Health Organization (WHO) and the International Labour Office.18

The New Zealand Standard. In New Zealand, when a mobile phone site is being planned, radio frequency engineers calculate the level of electromagnetic energy (EME) that will be emitted by the site. The level of EME is predicted by taking into account factors such as power output, cable loss, antenna gain, path loss, and height and distance from the antenna. These calculations allow engineers to determine the maximum possible emissions in a worst-case scenario, i.e., as if the site was operated at maximum power all the time. The aim is to ensure that EME levels are below international and NZ standards in areas where the general public has unrestricted access.

All mobile phone sites in New Zealand must comply in all respects with the NZ standard for radio frequency exposures.19 This standard is the same as used in most European countries, and is more stringent than that used in the United States, Canada, and Japan. Some local communities in New Zealand have even lower exposure-level standards; however, in reality mobile phone sites only operate at a fraction of the level set by the NZ standard. The National Radiation Laboratory has measured exposures around many operating cell sites, and maximum exposures in publicly accessible areas around the great majority of sites are less than 1% of the exposure limit of the NZ standard. Exposures are rarely more than a few percent of the limit, and none have been above 10%.

Court Decisions

Two court cases in New Zealand have alleged adverse effects due to CPBSs: McIntyre v. Christchurch City

^{16.} K. Mann and J. Röschke, "Effects of Pulsed High-Frequency Electromagnetic Fields on Human Sleep," Neuropsychobiology 33, no. 1 (1996): 41-47; Krause et al.: Alexander Borbely et al., "Pulsed High-Frequency Electromagnetic Field Affects Human Sleep and Sleep Electroencephalogram," Neurosci Let, 275, no. 3 (1999): 207-210; L. Kellenyi et al., "Effects of Mobile GSM Radiotelephone Exposure on the Auditory Brainstem Response (ABR)," Neurobiology 7, no. 1 (1999): 79-81; B. Hocking, "Preliminary Report: Symptoms Associated with Mobile Phone Use," Occup Med 48, no. 6 (Sept. 1998): 357-360; and others as reported in Neil Cherry, Health Effects Associated with Mobil Base Stations in Communities: The Need for Health Studies, Environmental Management and Design Division, Lincoln University (June 8, 2000); http://pages.britishlibrary.net/orange/cherryonbasestations.htm.

^{17.} Cherry.

^{18.} Ministry for the Environment and Ministry of Health.

^{19.} NZS 2772.1:1999, "Radiofrequency Fields Part I: Maximum Exposure Levels - 3kHz to 300GHz." This standard was based largely on the 1998 ICNIRP recommendations for maximum human exposure levels to radio frequency. The standard also includes a requirement for minimizing radio frequency exposure. See National Radiation Laboratory, Cell Sites (March 2001), 7; available at http://www.nrl.moh.govt.nz/CellsiteBooklet.pdf

Council²⁰ and Shirley Primary School v. Telecom Mobile Communications Ltd.21 Very few cell site cases have actually proceeded to Environment Court hearings. In these two cases the plaintiffs claimed that there was a risk of adverse health effects from radio frequency radiation emitted from cell phone base stations and that the CPBSs had adverse visual effects.

In McIntyre, Bell South applied for resource consent to erect a CPBS. The activity was a noncomplying activity under the Transitional District Plan. Residents objected to the application. Their objections were related to the harmful health effects from radio frequency radiation. In particular, they argued it would be an error of law to decide, based on the present state of scientific knowledge, that there are no harmful health effects from low-level radio frequency exposure. It was also argued that the Resource Management Act contains a precautionary policy and also requires a consent authority to consider potential effects of low probability but high impact in reviewing an application.

The Planning Tribunal considered residents' objections and heard experts' opinions as to the potential health effects, and granted the consent, subject to conditions. It was found that there would be no adverse health effects from low levels of radiation from the proposed transmitter, not even effects of low probability but high potential impact.

In Shirley Primary School, Telecom applied to the Christchurch City Council for resource consent to establish, operate, and maintain a CPBS on land adjacent to the Shirley Primary School. This activity was a noncomplying activity under the Transitional District Plan. Again, the city council granted the consent subject to conditions. However, the school appealed the decision, alleging the following four adverse effects:

- · Risk of adverse health effects from the radio frequency radiation emitted from the cell site
- · Adverse psychological effects on pupils and teachers because of the perceived health risks
- Adverse visual effects
- · Reduced financial viability of the school if pupils withdraw because of the perceived adverse health effects

The court concluded that the risk of the children or teachers at the school developing leukemia or other cancers from radio frequency radiation emitted by

the cell site is extremely low, and the risk to the pupils of developing sleep disorders or learning disabilities because of exposure to radio frequency radiation is higher, but still very small. Accordingly, the Telecom proposal was allowed to proceed.

In summary, the Environmental Court ruled that there are no established adverse health effects from the emission of radio waves from CPBSs and no epidemiological evidence to show this. The court was persuaded by the ICNIRP guidelines that risk of health effects from low-level exposure is very low and that the cell phone frequency imposed by the NZ standard is safe, being almost two and one-half times lower than that of the ICNIRP.

The court did concede that while there are no proven health effects, there was evidence of property values being affected by both of the health allegations. The court suggested that such a reduction in property values should not be counted as a separate adverse effect from, for example, adverse visual or amenities effects. That is, a reduction in property values is not an environmental effect in itself; it is merely evidence, in monetary terms, of the other adverse effects noted.

In a third case, Goldfinch v. Auckland City Council,22 the Planning Tribunal considered evidence on potential losses in value of the properties of objectors to a proposal for the siting of a CPBS. The court concluded that the valuer's monetary assessments support and reflect the adverse effects of the CPBS. Further, it concluded that the effects are more than just minor as the CPBS stood upon the immediately neighboring property.

Literature Review

While experimental and epidemiological studies have focused on the adverse health effects of radiation from the use of cell phones and CPBSs, few studies have been conducted to ascertain the impact of CPBSs on property values. Further, little evidence of property value effects has been provided by the courts. Thus, the extent to which opposition from property owners affected by the siting of CPBSs is reflected in lower property values is not well known in New Zealand.

Two studies have been conducted to ascertain the adverse health and visual effects of CPBSs on property values. Telecom commissioned Knight Frank (NZ) Ltd to undertake a study in Auckland in 1998/

^{20.} NZRMA 289 (1996).

^{21.} NZRMA 66 (1999).

^{22.} NZRMA 97 (1996).

99 and commissioned Telfer Young (Canterbury) Ltd to undertake a similar study in Christchurch in 2001. Although the studies show that there is not a statistically significant effect on property prices where CPBSs are present,25 the research in both cases involves only limited sales data analysis. Further, no surveys of residents' perceptions were undertaken, and the studies did not examine media attention to the sites and the impact this may have on saleability of properties in close proximity to CPBSs. Finally, as the sponsoring party to the research was a telecommunication company it is questionable whether the results are completely free from bias. Hence, the present study aims to help fill the research void on this contentious topic in an objective way.

CPBSs are very similar structures to high-voltage overhead transmission lines (HVOTLs); therefore it is worthwhile to review the body of literature on the property values effects of HVOTLs. The only recently published study in New Zealand on HVOTLs effects is by Bond and Hopkins.²⁴ Their research consists of both a regression analysis of residential property transaction data and an opinion survey to determine the attitudes and reactions of property owners in the study area toward living close to HVOTLs and pylons.

The results of the sales analysis indicate that having a pylon close to a particular property is statistically significant and has a negative effect of 20% at 10-15 meters from the pylon, decreasing to 5% at 50 meters. This effect diminishes to a negligible amount after 100 meters. However, the presence of a transmission line in the case study area has a minimal effect and is not a statistically significant factor in the sale prices.

The attitudinal study results indicate that nearly two-thirds of the respondents have negative feelings about the HVOTLs. Proximity to HVOTLs determines the degree of negativity: respondents living closer to the HVOTLs expressed more negative feelings towards them than those living farther away. It appears, however, from a comparison of the results, that the negative feelings expressed are often not reflected in the prices paid for such properties.

There have been a number of HVOTLs studies carried out in the United States and Canada. A major review and analysis of the literature by Kroll and Priestley indicates that in about half the studies, HVOTLs have not affected property values and in the rest of the studies there is a loss in property value between 2%-10%.25 Kroll and Priestley are generally critical of most valuer-type studies because of the small number of properties included and the failure to use econometric techniques such as multiple regression analysis. They identify the Colwell study as one of the more careful and systematic analyses of residential impacts.26 That study, carried out in Illinois, finds that the strongest effect of HVOTLs is within the first 15 meters, but the effect dissipates quickly with distance, disappearing beyond 60 meters.

A Canadian study by Des Rosiers, using a sample of 507 single-family house sales, finds that severe visual encumbrance due to a direct view of either a pylon or lines exerts a significant, negative impact on property values; however location adjacent to a transmission corridor may increase value.27 This was particularly evident where the transmission corridor was on a well-wooded, 90-meter right-of-way. The proximity advantages include enlarged visual field and increased privacy. The decrease in value from the visual impact of the HVOTLs and pylons (on average between 5% and 10% of mean house value) tends to be cancelled out by the increase in value from proximity to the easement.

A study by Wolverton and Bottemiller²⁸ uses a paired-sale analysis of home sales in 1989-1992 to ascertain any difference in sale price between properties abutting rights-of-way of transmission lines (subjects) in Portland, Oregon; Vancouver, Washington; and Seattle, Washington; and those located in the same cities but not abutting transmission line rights-of-way (comparisons). Subjects sold during the study period were selected first; then a matching comparison was selected that was as similar to the subject as possible. The study results did not support a finding of a price effect from abutting an HVTL right-of-way. In their conclusion, the authors

^{23.} Mark Dunbar, Telfer Young research valuer, personal communication with Bond, 2002. The results of these studies have not been made publicly known. The study by Knight Frank of Auckland was conducted by Robert Albrecht.

^{24.} S. G. Bond and J. Hopkins, "The Impact of Transmission Lines on Residential Property Values: Results of a Case Study in a Suburb of Wellington, New Zealand," Pacific Rim Property Research Journal 6, no. 2 (2000): 52-60.

^{25.} C. Kroll and T. Priestley, "The Effects of Overhead Transmission Lines on Property Values: A Review and Analysis of the Literature," Edison Electric Institute (July 1992).

^{26.} Peter F. Colwell, "Power Lines and Land Value," Journal of Real Estate Research 5, no. 1 (Spring 1990): 117-127.

^{27.} François Des Rosiers, "Power Lines, Visual Encumbrance and House Values: A Microspatial Approach to Impact Measurement," Journal of Real Estate Research 23, no. 3 (2002): 275-301.

^{28.} Marvin L. Wolverton and Steven C. Bottemiller, "Further Analysis of Transmission Line Impact on Residential Property Values," The Appraisal Journal (July

warn that the results cannot and should not be generalized outside of the data. They explain that

limits on generalizations are a universal problem for real property sale data because analysis is constrained to properties that sell and sold properties are never a randomly drawn representative sample. Hence, generalizations must rely on the weight of evidence from numerous studies, samples, and locations.29

Thus, despite the varying results reported in the literature on property value effects from HVOTLs, each study adds to the growing body of evidence and knowledge on this (and similar) valuation issue(s). The study reported here is one such study.

Opinion Survey Research Objectives and Methodology

Research by Abelson;⁵⁰ Chalmers and Roehr;³¹ Kinnard, Geckler and Dickey;⁵² Bond;⁵³ and Flynn et al., ⁵⁴ recommend the use of market sales analysis in tandem with opinion survey studies to measure the impact of environmental hazards on residential property values. The use of more than one approach provides the opportunity to compare the results from each and to derive a more informed conclusion than obtained from relying solely on one approach. Thus, the methods selected for this study include a public opinion survey and a hedonic house price approach (as proposed by Freeman³⁵ and Rosen³⁶). A comparison of the results from both of these techniques will reveal the extent to which the market reacts to cell phone towers.

Public Opinion Survey

An opinion survey was conducted to investigate the current perceptions of residents towards living near CPBSs and how this proximity might affect property values. Case study areas in the city of Christchurch were selected for this study. The study included residents in ten suburbs: five case study areas (within 500 meters of a cell phone tower) and five control areas (over 1 kilometer from the cell phone tower). The five case study suburbs were matched with five control suburbs that had similar living environments (in socioeconomic terms) except for the presence of a CPBS.

The number of respondents to be surveyed (800) and the nature of the data to be gathered (perceptions/personal feelings towards CPBSs) governed the choice of a self-administered questionnaire as the most appropriate collection technique. Questionnaires were mailed to residents living in the case study and control areas.

A self-administered survey helps to avoid interviewer bias and to increase the chances of an honest reply where the respondent is not influenced by the presence of an interviewer. Also, mail surveys provide the time for respondents to reflect on the questions and answer these at their leisure, without feeling pressured by the time constraints of an interview. In this way, there is a better chance of a thoughtful and accurate reply.

The greatest limitation of mail surveys is that a low response rate is typical. Various techniques were used to help overcome this limitation, including careful questionnaire design; inclusion of a free-post return envelope; an accompanying letter ensuring anonymity; and reminder letters. An overall response rate of 46% was achieved for this study.

The questionnaire contained 43 individual response items. The first question acted as an identifier to determine whether the respondent was a homeowner or tenant. While responses from both groups were of interest, the former was of greater importance, as they are the group of purchasers/sellers that primarily influence the value of property. However, it was considered relevant to survey both groups as both are affected by proximity to a CPBS to much the same extent from an occupiers' perspective, i.e., they both may perceive risks associated with a CPBS. It was hypothesized that tenants, being lesspermanent residents, would perceive the effects in a similar way, but to a much lesser degree.

Other survey questions related to overall neighborhood environmental desirability; the timing of

^{29.} Ibid., 252.

^{30.} P.W. Abelson, "Property Prices and Amenity Values," Journal of Environmental Economics and Management 6 (1979): 11-28.

^{31.} James A. Chalmers and Scott Roehr, "Issues in the Valuation of Contaminated Property," The Appraisal Journal (January 1993): 28-41.

^{32.} W. N., Kinnard, M. B. Geckler, and S. A. Dickey, "Fear (as a Measure of Damages) Strikes Out: Two Case Studies Comparisons of Actual Market Behaviour with Opinion Survey Research" (paper presented at the Tenth Annual American Real Estate Society Conference, Santa Barbara, California, April 1994).

^{33,} S. G. Bond, "Do Market Perceptions Affect Market Prices? A Case of a Remediated Contaminated Site," in Real Estate Valuation Theory, ed. K. Wang and M. L. Wolverton, 285-321 (Boston: Kluwer Academic Publishers, 2002).

^{34.} James Flynn et al., "Survey Approach for Demonstrating Stigma Effects in Property Value Litigation," The Appraisal Journal (Winter 2004): 35-45.

^{35.} A. Myrick Freeman, The Benefits of Environmental Improvement; Theory and Practice (Baltimore: John Hopkins Press, 1979).

^{36.} Sherwin Rosen, "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition," Journal of Political Economy 82, no. 1 (Jan/Feb 1974): 34-55.

the CPBS's construction and its proximity in relation to the respondent's home; the importance placed on the CPBS as a factor in relocation decisions and on the price/rent the respondent was prepared to pay for the house; how a CPBS might affect the price the respondent would be willing to pay for the property; and the degree of concern regarding the effects of CPBSs on health, stigma, aesthetics, and property values. The surveys were coded to identify the property address of the respondent. This enabled each respondent's property to be located on a map and to show this in relation to the cell site.

Eighty questionnaires⁵⁷ were distributed to each of the ten suburbs (five case study and five control areas) in Christchurch. Respondents were instructed to complete the survey and return it in the free-post, self-addressed envelope provided. The initial response rate was 31%. A month later, a further 575 questionnaires with reminder letters were sent out to residents who had not yet responded. A total response rate of 46% was achieved. Response rates from each suburb ranged from 33% (Linwood) to 61% (Bishopdale).

The questionnaire responses were coded and entered into a computerized database.⁵⁸ The analysis of responses included the calculation of means and percentage of responses to each question to allow for an overview of the response patterns in each area.

Case Study and Control Areas

The suburbs of Beckenham, Papanui, Upper Riccarton, Bishopdale, and St Albans were selected for the case study because there is at least one CPBS within each of these communities. Census data, providing demographic and socioeconomic characteristics of geographic areas, was used to select the control suburbs of Spreydon, Linwood, Bromley, Avonhead, and Ilam. 39 The control areas are located further away (over 1 kilometer) from the CPBS in their matched case study area. As well as matching demographic and socioeconomic characteristics, each suburb was selected based on its similarity to its matched case study area in terms of living environment and housing stock, distance to the central business district, and geographic size; the only dissimilarity is that there are no CPBSs in the control areas. (See Appendix I for a location map.)

Demographic statistics show that Bromley and Ilam comprise a younger population (median age about 33), with Bishopdale and Upper Riccarton having an older population (median age about 40). The ethnic breakdown of each suburb indicates that Papanui and Spreydon have the highest proportion of Europeans (about 90%), Bromley has the highest proportion of both Maoris and Pacific Islanders (13.9% and 8.5% respectively), while Ilam, Avonhead, and Upper Riccarton have the highest proportion of Asians (16.1% to 18.5%).40

Median household and median family incomes (MHI and MFI) are highest in Ilam and Avonhead (MHI: \$34,751NZ, \$53,405NZ; MFI: \$51,530NZ, \$65,804NZ, respectively) and lowest in Linwood and Beckenham (MHI: \$22,275NZ, \$26,398NZ; MFI: \$29,673NZ, \$33,847NZ respectively).41 Residents of St Albans West have the highest levels of education (21.7% have a degree or a higher degree) followed by Upper Riccarton (18.7%), Ilam (16.7%), and Avonhead (16.2%). These same suburbs have the highest proportion of professionals by occupational class (20.3% to 27.3%). Residents of Bromley have the lowest education (40% have no qualification) and the lowest proportion of professionals (5.5%).42

In summary, the socioeconomic data shows that Ham is the more superior suburb, followed by Avonhead, Upper Riccarton, St Albans West, and Papanui. The lower socioeconomic areas are, in decreasing order, Spreydon, Bishopdale, Bromley, Beckenham, and Linwood.

Survey Results

A summary of the main findings from the survey is presented in Appendix II, and the survey results are discussed in the following.

Response Rates

Of the 800 questionnaires mailed to homeowners and tenants in the case study and control areas (400 to each group), 50% from the case study area and 41%

^{37.} Approved by the University of Auckland Human Subjects Ethics Committee (reference 2002/185).

^{38.} The computer program SPSS was selected as the appropriate analytical tool for processing the data.

^{39.} The census is conducted in New Zealand every five years, and the data used to define the control areas is from the latest census conducted in 2001. see Christchurch City Area Unit Profile, 2001 at http://www.ccc.govt.nz/Census/ChristchurchCityAreaUnitProfile.xls.

^{40.} Christchurch City Area Unit Profile statistics.

^{41. \$1}NZ = \$0.65US, thus, \$34,751NZ = \$22,588US.

^{42.} The median house price for Christchurch city in August 2003 was \$185,000NZ/\$120,000US (New Zealand national median house price at this time was \$215,000NZ/\$140,000US), http://www.reinz.co.nz/files/HousingFacts-Sample-Pg1-5.pdf (accessed March 17, 2004). Median house prices in each individual suburb could not be obtained as the median sales data from the Real Estate Institute of NZ (REINZ) contains more than one suburb in each location grouping.

from the control area were completed and returned. Over three-quarters (78.5%) of the case study respondents were homeowners compared to 94% in the control area.

Desirability of the Suburb as a Place to Live

More than half (58.3%) the case study respondents have lived in their suburb for more than five years (compared to 65% in the control group) and a quarter (25%) have lived in their suburb between 1 and 4 years (compared to 28% in the control group).

Around two-thirds (65% of the case study respondents and 68% of the control group respondents) rated their neighborhoods as either above average or superior as a place to live when compared with other similar named suburbs. The reasons given for this include close proximity to amenities (shops, library, medical facilities, public transport, and recreational facilities) and good schools.

Reasons given for rating the case study neighborhoods inferior to other similar neighborhoods include lower house prices, older homes, more student housing and lower-income residents. The reasons given by the control group respondents for an inferior rating include distance from the central business district (Avonhead); smell from the sewerage oxidation ponds and composting ponds (Bromley); and lower socioeconomic area and noise from the airport (Linwood).

Feelings About a CPBS as an Element of the Neighborhood

In the case study areas, a CPBS had already been constructed when only 39% of the respondents bought their houses or began renting in the neighborhood. Some responded that they were not notified that the CPBS was to be built, that they had no opportunity to object to it, and that they felt they should have been consulted about its construction. For the respondents who said that proximity to the tower was of concern to them, the most common reasons given for this were the impact of the CPBS on health, aesthetics, and property values. Nearly three-quarters (74%) of the respondents said they would have gone ahead with the purchase or rental of their property anyway if they had known that the CPBS was to be constructed.

In the control areas nearly three-quarters (72%) of the respondents indicated they would be opposed to construction of a CPBS nearby. The location of a CPBS would be taken into account by 83% of respondents if they were to consider moving. As with the case study respondents, the control group respondents who were concerned about proximity to a

CPBS were most often concerned about the effects of CPBSs on health, aesthetics, and property values.

Impact on Decision to Purchase or Rent

In the case study areas, the tower was visible from the houses of 46% of the respondents, yet two-thirds (66%) of these said it was barely noticeable, and one-quarter said it mildly obstructed their view. When asked in what way the CPBS impacts the enjoyment of living in their home, 37% responded that its impact was related to health concerns, 21% said it impacted neighborhood aesthetics, 20% said it impacted property value, and 12% said it impacted the view from their property.

When asked about the impact that the CPBS had on the price/rent they were prepared to pay for their property, over half the case study respondents (53.1%) said that the tower was not constructed at the time of purchase/rental, and 51.4% of the respondents said the proximity to the CPBS did not affect the price they were prepared to pay for the property. Nearly 3% said they were prepared to pay a little less, 2% said they were prepared to pay a little more. For the control group respondents, 45% of the respondents would pay substantially less for a property if a CPBS were located nearby, over one-third (38%) were prepared to pay just a little less for such a property, and 17% responded that a CPBS would not influence the price they would pay.

Only 10% of the case study respondents gave an indication of the impact that the CPBS had on the price/rent they were prepared to pay for the property; one-third of these felt it would decrease price/ rent by 1% to 9%. For the control group, over onethird (38%) of the respondents felt that a CPBS would decrease price/rent by more than 20%, and a similar number (36%) said they would be prepared to pay 10% to 19% less for property located near a CPBS. The responses are outlined in Table 1.

Table I Impact of a CPBS on Purchase/Rental **Price Decision**

:	Percent of Case Study Respondents (Control Group
Price/Rent Effect	Responses)
20% more	5% (3%)
10-19% more	10% (2%)
1-9% more	14% (2%)
1-9% less	33% (19%)
10-19% less	24% (36%)
20% or greater reduction in price/re	nt 14% (38%)

Interestingly, it would seem that those living farther away from the CPBSs (the control group) are far more concerned about proximity to CPBSs than those living near CPBSs (the case study group); they indicated that a CPBS would have a greater price/ rent effect. The possible explanations for this are discussed in the survey results section.

Concerns About Proximity to the CPBS

Most case study respondents were not worried about the effects of proximity to a CPBS related to health (50%), stigma (55%), future property value (61%), or aesthetics (63%). About one-quarter to one-third of these respondents were somewhat worried about the impact of proximity to a CPBS on health (38%), stigma (34%), future property value (25%), or aesthetics (25%). From the list of issues, respondents were most worried about future property value, but only 13.5% of the respondents responded this way.

Here again, control group respondents were much more concerned about the effects of proximity to a CPBS than their case study counterparts. Of the possible concerns about CPBSs on which respondents were asked to comment, control group respondents were most worried about the negative effects on future property values and aesthetics. Nearly half the respondents were worried a lot about these issues. Similar responses were recorded for the possibility of harmful health effects in the future from CPBSs (42% were worried a lot about this) and stigma associated with houses near CPBSs (34% were worried a lot). The responses regarding concerns about living near a CPBS are shown in Table 2.

In both the case study and control areas, the issue of greatest concern for respondents was the impact of proximity to CPBSs on future property values. The main concerns related to CPBSs were the unknown potential health effects, the possible socioeconomic implications of the siting of CPBSs, and how CPBSs affect property values. There also were concerns that the city council was not notifying the public about the possible construction of CPBSs.

Discussion of the Survey Results

The results were mixed, with responses from residents ranging from having no concerns to being very concerned about proximity to a CPBS. In general, those people living in areas farther from CPBSs were much more concerned about issues related to proximity to CPBSs than residents who lived near CPBSs.

Over 40% of the control group respondents were worried a lot about future health risks, aesthetics, and future property values compared with the case study areas, where only 13% of the respondents were worried a lot about these issues. However, in both the case study and control areas, the impact of proximity to CPBSs on future property values is the issue of greatest concern for respondents. If purchasing or renting a property near a CPBS, over a third (38%) of the control group respondents said a CPBS would reduce the price of their property by more than 20%. The perceptions of the case study respondents were again less negative, with a third saying they would reduce the price by only 1%-9%, and 24% saying they would reduce the price by 10%-19%.

The lack of concern shown by the case study respondents may be due to the CPBSs being either not visible or only barely visible from their homes. The CPBSs may be far enough away from respondents' properties (as was indicated by many respondents, particularly in St Albans West, Upper Riccarton, and Bishopdale) or hidden by trees and consequently not perceived as affecting the properties. The results may have been quite different had the CPBS being more visually prominent.

Alternatively, the apparent lower sensitivity to CPBSs of case study residents compared to the control group residents may be due to cognitive dissonance reduction. In this case, respondents may be unwilling to admit, due to the large amounts of money already paid, that they may have made a poor purchase or rental decision in buying or renting property located near a CPBS. Similarly, the homeowners may be unwilling to admit there are concerns about CPBSs when the CPBSs were built

Table 2 Concerns about Living Near a CPBS*

Concern	Does not worry me	Worries me somewhat	Worries me a lot
Possibility of harmful health effects	50% (20%)	38% (38%)	12% (42%)
Stigma effect	55% (21%)	34% (45%)	12% (34%)
Effect on future property values	61% (15%)	25% (37%)	13% (47%)
Aesthetics	63% (18%)	25% (37%)	11% (45%)

^{*} Percent of case study respondents having that concern (control group respondents). All numbers are rounded

after they had purchased their homes, because to do so might have a negative impact on property values.

Regardless of the reasons for the difference in responses from the case study and control groups, the overall results show that residents perceive CPBSs negatively. In both the case study and control areas, the impact of proximity to CPBSs on future property values was the issue of greatest concern for respondents. Overall, respondents felt that proximity to a CPBS would reduce value by from 10% to over 20%. The second part of the study outlined below, involving an econometric analysis of Christchurch property sales transaction data, helps to confirm these results.

Respondents' comments added at the end of the survey indicate that residents have ongoing concerns about CPBSs. Although some people accepted the need for CPBSs, they said that they did not want them built in their back yard, or they preferred that they be disguised to blend better with their environment.

Market Study Research Objectives and Methodology

A market study was undertaken to test the hypothesis that in suburbs where there is a CPBS it will be possible to observe discounts to the selling price of homes located near these structures. Such discounts would be observed where buyers of proximate homes view the CPBSs in negative terms due to a perceived risk of adverse effects on health, aesthetics, and property value.

The literature dealing specifically with the measurement of the impact of environmental hazards on residential sale prices (including proximity to transmission lines, landfill sites, and ground water contamination) indicates the popularity of hedonic pricing models, as introduced by Court⁴⁵ and later Griliches,44 and further developed by Freeman45 and Rosen.46 The more recent studies, including those by Dotzour;47 Simons and Sementelli;48 and Reichert, 49 focus on proximity to an environmental hazard and demonstrate that this reduces residential house prices by varying amounts depending on the distance from the hazard.⁵⁰ However, there are no known published studies that use hedonic housing models to measure the impact of proximity to a CPBS on residential property values.

As in the previous residential house price studies, the standard hedonic methodology was used here to quantify the impact of a CPBS on sale prices of homes located near a CPBS. The results from this study in tandem with the opinion survey results will help test the hypothesis that proximity to a CPBS has a negative impact on property value and will reveal the extent to which the market reacts to CPBSs.

Model Specification

A hedonic price model is constructed by treating the price of a property as a function of its utility-bearing attributes. Independent variables used in the model to account for the property attributes are limited to those available in the data set and known, based on other well-tested models reported in the literature and from valuation theory, to be related to property price. The basic model used to analyze the impact on sale price of a house located near a CPBS, is as follows:

$$P_i = f(X_{I,i'} X_{2,i} \dots X_{n,i})$$

where:

 P_i = property price at the i th location $X_{i,i} \dots X_{n,i} =$ individual characteristics of each sold property (e.g., land area, age of house, floor area, sale date, construction materials, house condition, CPBS construction date, etc.)

The more recent hedonic pricing studies that demonstrate the effects of proximity to an environmental hazard use different functional forms to represent the relationship between price and various property characteristics.51 In hedonic housing models the linear and log-linear models are most popular. The linear model implies constant partial effects between house prices and housing characteristics, while the log-linear model allows for nonlinear price effects and is shown in the following equation:

^{43.} A. T. Court. "Hedonic Price Indexes with Automotive Examples," in The Dynamics of Automobile Demand (New York: General Motors, 1939).

^{44.} Zvi Griliches, ed. Price Indexes and Quality Change (Cambridge, Mass.: Harvard University Press, 1971).

^{45.} Freeman.

^{46.} Rosen.

^{47.} Mark Dotzour, "Groundwater Contamination and Residential Property Values," The Appraisal Journal (July 1997): 279-285.

^{48.} Robert A. Simons and Arthur Sementelli, "Liquidity Loss and Delayed Transactions with Leaking Underground Storage Tanks," The Appraisal Journal (July 1997): 255-260

^{49.} Alan K. Reichert, "Impact of a Toxic Waste Superfund Site on Property Values," The Appraisal Journal (October 1997): 381-392.

^{50.} Only Dotzour found no significant impact of the discovery of contaminated groundwater on residential house prices. This was likely due to the nonhazardous nature of the contamination where the groundwater was not used for drinking purposes.

^{51.} See for example L. Dale et al., "Do Property Values Rebound from Environmental Stigmas? Evidence from Dallas," Land Economics 75, no. 2 (May 1999): 311-326; Dotzour: Simons and Sementelli: and Reichert.

$$\begin{aligned} \ln P_i &= b_o + b_i \times X_{l,i} + b_2 \times X_{2i} + b_3 \times X_{3i} \\ &\dots \dots + b_n \times X_{n+1} + a_o \times D_o + \\ &\dots \dots + a_m \times D_m + e_o \end{aligned}$$

where:

 lnP_i = the natural logarithm of sale price

 $b_0 =$ the intercept

 $b_t \dots b_n$; $a_0 \dots a_m$ = the model parameters to be estimated, i.e., the implicit unit prices for increments in the property characteristics

> $X_t \dots X_n$ = the continuous characteristics, such as land area

 $D_{\scriptscriptstyle n} \dots D_{\scriptscriptstyle m} =$ the categorical (dummy) variables, such as whether the sale occurred before (0) or after (1) the CPBS was built

Sometimes the natural logarithm of land area and floor area is also used. The parameters are estimated by regressing property sales on the property characteristics and are interpreted as the households' implicit valuations of different property attributes. The null hypothesis states that the effect of being located near a CPBS does not explain any variation in property sale prices.

The Data

Part of the process for selecting appropriate case study areas was identifying areas where there had been a sufficient number of property sales to provide statistically reliable and valid results. Sales were required for the period before and after the CPBS had been built in order to study the impact of the CPBS on the surrounding properties' sale prices.

Further, due to the multitude of factors that combine to determine a neighborhood's character, such as proximity to the central business district, standard of schooling, recreational facilities provided, standard of housing, proximity to amenities, and the difficulty in allowing for these separately, sales located in areas with comparable neighborhood characteristics were preferred.

Four of the suburbs in the survey case study met the criteria for the market study: St Albans, Beckenham, Papanui, and Bishopdale. No sales data was available for Upper Riccarton after the CPBS was built in this suburb, hence this suburb was not included in the market analysis study. As each CPBS was built at a different date, the sales from each suburb were separately analyzed. The uniformity of locational and neighborhood characteristics in each of these suburbs allows the analysis to be simplified and to focus on the properties' physical attributes. The relative homogeneity of housing, locational, and neighborhood attributes was verified through field inspections.

The dependent variable is the property sale price. The data set includes 4283 property sales that occurred between 1986 and 2002 (approximately 1000 sales per suburb).⁵²

The independent data set was limited to those variables that correspond to property attributes known and suspected to influence price. These variables are floor area (m2); land area (ha); age of the house (the year the house was built); tower (a dummy variable indicating whether the sale occurred before or after the CPBS was built); sale date (month and year); time of sale based on the number of quarters before or after the CPBS was built (to help control for movements in house prices over time); category of residential property (stand-alone dwelling, dwelling converted into flats, ownership unit, etc); quality of the principal structure (as assessed by an appraiser); and roof and wall materials. The number of bedrooms was not available in the data set, but would not have been included as an independent variable since the number of bedrooms is highly correlated with floor area.

Since the GIS coordinates of properties for the initial analysis were not available, street name was included as an independent variable instead. To a limited extent, street name helped to control for the proximity effects of a CPBS. It was suspected that houses on a street close to a CPBS may, on average, sell for less than houses on a street farther away from the CPBS.

While views, particularly water views, have been shown in previous empirical studies to be an important attribute affecting sale price, in the present study the flat contour of the landscape where the homes are located, together with the suburban nature of the environment surrounding these, precluded any significant views. Thus, views were not included in the analysis. Further, due to the large number of sales included in the analysis, inspections of each individual property were not made to determine the view, if any, of a CPBS from each house. It was felt that it is not merely the view that may impact on price, but also proximity to a CPBS due to the potential effect this may have on health, cell phone coverage, and neighborhood aes-

^{52.} These sales were obtained from Headway Systems Ltd, a data distribution and system development company. Headway is the major supplier of property market sales information to New Zealand's valuation profession; it is jointly owned by the NZ Institute of Valuers (NZIV) and PT Investments, a consortium of 28 shareholders from within the property industry.

thetics. Hence, view of a CPBS was not included as an independent variable. The variable descriptions are listed in Table 3. Variable codes are shown in Appendix III and basic descriptive statistics for selected quantitative variables are shown in Appendix IV.

Table 3 Variable Descriptions

Variable*	Definition
SLNETX	Sale price of the house (NZ\$)
SITSTX	Street name
CATGYX2	Category of dwelling: D, E, etc.†
CATGYX4	Quality of the structure: A, B, C [†]
TIMESOLD.Q	Using the time the cell phone tower was
	built as a baseline quarter, the number of
	quarters before (-) and after (+) it was built
AGE	Year the house was built
LANDAX	Land area (ha)
MATFAX	Total floor area (m²)
WALLCNX	Wall construction: W, B, C, etc. †
ROOFCNX	Roof construction: W, B, C, etc. †
TOWER	An indicator variable: 0 if before the cell
	phone tower was built, or 1 after it was
	built

^{*} Sale price is the dependent variable

Market Study Results

An econometric analysis of Christchurch property transaction data helped to confirm the opinion survey results. In the analysis of selected suburbs, the sales data from sales that occurred before a CPBS was built was compared to sales data from after a CPBS was built to determine any variance in price, after accounting for all the relevant independent variables.

Empirical Results

The model of choice is one that best represents the relationships between the variables and has a small variance and unbiased parameters. Various models were tested and the results are described in the next section. The following statistics were used to help select the most appropriate model: the adjusted coefficient of determination (adjusted R^2); the standard error of the regression equation; the AIC53 and BIC54 statistics; and t-test of significance of the coefficients and F-statistic.

Significance of Variables and the Equation: St Albans

As hedonic prices can vary significantly across different functional forms, various commonly used functional forms were examined to determine the model specification that best describes the relationship between price and the independent variables. Also, to test the belief that the relationship between Price and Land Area is not a linear function of Price, the variable LANDAX (land area) was transformed to reflect the correct relationship. Several transformations were tested including: linear of SLNETX (sale price) and log of LANDAX; log of SLNETX and linear of LANDAX; and log of SLNETX and log of LANDAX. All dummy variables remained in their linear form in each model.

It was found that the best result was obtained from using the log of SLNETX and log of LANDAX, and the linear form of all the dummy variables. Taking the log of an independent variable implies diminishing marginal benefits. For example, an extra 50 square meters of land area on a 550-square-meter site would be worth less than the previous 50 square meters. The log-log model shows the percent change in price for a one-percent change in the independent variable, while all other independent variables are held constant (as explained in Hill, Griffiths, and Judge).55

In the semilogarithmic equation the interpretation of the dummy variable coefficients involves the use of the formula: $100(e^{b_n} - 1)$, where b_n is the dummy variable coefficient.⁵⁶ This formula derives the percentage effect on price of the presence of the factor represented by the dummy variable and is advocated over the alternative, and commonly misused, formula of 100. (b_a). The resulting model included all the available variables as follows:

$$\log(SLNETX) = \alpha + \beta_1 \times TOWER + \beta_2 \times SITSTX \\ + \beta_5 \times CATGYX2 + \beta_4 \times CATGYX4 \\ + \beta_5 \times TIMESOLD \times Q + \beta_6 \times AGE \\ + \beta_7 \times \log(LANDAX) \\ + \beta_8 \times MATFAX \\ + \beta_9 \times WALLCNX \\ + \beta_{10} \times ROOFCNX$$

⁺ See Appendix III for explanation of variable codes.

^{53.} AIC is the Akaike Information Criterion, and is a "goodness of fit" measure involving the standard error of the regression adjusted by a penalty factor. The model selected is the one that minimizes this criterion (Microsoft SPSSPC Online Guide, 1997).

^{54.} The BIC is the Bayesian Information Criterion. Like the AIC, BIC takes into account both how well the model fits the observed data, and the number of parameters used in the model. The model selected is the one that adequately describes the series and has the minimum SBC. The SBC is based on Bayesian (maximum-likelihood) considerations, (Microsoft SPSSPC Online Guide, 1997).

^{55.} R. Carter Hill, William E. Griffiths, and George G. Judge, Undergraduate Econometrics (New York: John Wiley & Sons, 1997).

^{56.} See Robert Halvorsen and Raymond Palmquist, "The Interpretation of Durnmy Variables in Semi-Logarithmic Equations," American Economic Review 70, no. 3 (1980): 474-475

From the regression output, the variables *ROOFCNX* and WALLCNX were found to be insignificant so these were removed from the model and the regression was rerun. The table in Appendix V summarizes these results. The F-statistic (123) shows that the estimated relationship in the model is statistically significant at the 95% confidence level and that at least one of the coefficients of the independent variables within the model is not zero.

Table 4 summarizes the model selection test statistics. Based on the AIC and BIC, the regression that excludes the variables ROOFCNX and WALLCNX is superior to the regression that includes them (AIC and BIC are minimized). For this reason, the model excluding these variables was selected for analysis, and it is discussed next.

Table 4 Test Statistics — St Albans

	Adjusted R ²	AIC	BIC
Full Model	0.82	-118.38	36.55
Sub Model	0.82	-121.64	5.95

Tests for normality, heteroskedasticity, and multicollinearity generally indicated that the model was adequately specified and that the data were not severely ill conditioned (heteroskedasticity and multicollinearity were diminished when the data were transformed).

The coefficient of determination (R^2) indicates that approximately 82% of the variation in sale price is explained by the variation in the independent variable set. All variable coefficients had the expected signs,⁵⁷ except for *TOWER*, which was positive. The positive coefficient for TOWER shows that, when all the other variables are held constant, after the installation of a CPBS in St Albans, the price of a house would increase by $e^{0.1155} \approx 1.12$ (12%). A possible explanation is that cell phone technology was quite new at the time (1994), and as there had been little in the media about possible adverse health effects from CPBSs, people may have perceived it as a benefit as they were likely to get better cell phone coverage.

The most significant variables were TIMESOLD.Q (the quarter in which the sale occurred before or after the CPBS was built), log(LANDAX) (log of land area), and MATFAX (total floor area) and all have a positive influence on price. The positive TIMESOLD.Q indicates that the market was increasing over time since the CPBS was built (1994), but only to a limited extent (1.38%). The positive log of land area and total floor area shows that prices increase with increasing size.

The regression coefficient on log(LANDAX) is 0.3285, which indicates that, on average, a 10% increase in *LANDAX* will generate a 3.285% increase in price. The positive coefficient for MATFAX indicates that, when all the other variables are held constant, for each additional m2 the price would increase by $e^{0.0022514} \approx 1.0022314$ (0.22% increase).

Significance of Variables and the Equation:— Papanui

The same functional form used for St Albans was used for Papanui. From the regression output, the variable CATGYX2 was found to be insignificant so it was removed from the model and the regression was rerun; Appendix VI summarizes the results. The F-statistic (152) shows that the estimated relationship in the model is statistically significant at the 95% confidence level and that at least one of the coefficients of the independent variables within the model is not zero.

Table 5 summarizes the model selection test statistics. Based on the AIC and BIC, the regression that excludes the variable CATGYX2 is superior to the regression that includes it (AIC and BIC are minimized). For this reason, the model excluding this variable was selected for analysis, and is discussed next.

Table 5 Test Statistics — Papanui

	Adjusted R ²	AIC	BIC
Full Model	0.87	-509.91	-371.99
Sub Model	0.87	-510.57	-381.56

The coefficient of determination (R^2) indicates that approximately 87% of the variation in sale price is explained by the variation in the independent variable set. This would be considered high in comparison with the amount of explanation obtained in similar hedonic house studies reported in the literature.⁵⁸ All variable coefficients had the expected signs.

The most significant variables TIMESOLD.Q, MATFAX (total floor area), and TOWER. The former two have a positive influence on price. The positive TIMESOLD.Q indicates that the

^{57.} Note that the variable AGE is positive as this variable indicates the year the house was built; therefore, the higher the year, the younger the home. Newer houses have less wear and tear than older homes and sell, on average, for more than older homes.

^{58.} For example, Reichert obtained an adjusted R2 of 84%; Simons and Sementelli, 78%; Abelson, 68%; Dotzour, 56%-61%.

market was increasing over time since the CPBS was built (2000), but only by 1.4% per quarter. The positive coefficient for MATFAX indicates that, when all the other variables are held constant, the price would increase by $e^{0.0042576} \approx 1.00427$ (0.43%), with increasing size. The negative coefficient for TOWER shows that, when all the other variables are held constant, after the installation of a CPBS in Papanui, the price of a house would decrease by $e^{-0.2540} \approx 0.79$ (21% decrease).

Significance of Variables and the Equation: Beckenham

The same functional form used for Papanui and St Albans was used for Beckenham. From the regression output, the variable ROOFCNX was found to be insignificant so it was removed from the model and the regression was rerun; Appendix VII summarizes these results. The F-statistic (214) shows that the estimated relationship in the model is statistically significant at the 95% confidence level and that at least one of the coefficients of the independent variables within the model is not zero.

Table 6 summarizes the model selection test statistics. Based on the AIC and BIC, the regression that excludes the variable *ROOFCNX* is superior to the regression that includes it (AIC and BIC are minimized). For this reason, the model excluding this variable was selected for analysis.

Table 6 Test Statistics — Beckenham

	Adjusted R ²	AIC	BIC
Full Model	0.89	-819.00	-641.39
Sub Model	0.89	-818.66	-650.66

The coefficient of determination (R^2) indicates that approximately 89% of the variation in sale price is explained by the variation in the independent variable set. Again, as with the model for Papanui this amount of explanation would be considered high.

The most significant variables were TIMESOLD.Q, MATFAX, and TOWER. The former two have a positive influence on price. The positive TIMESOLD. Q indicates that the market was increasing over time since the CPBS was built in 2000, but only by 1.91% per quarter. The positive coefficient for MATFAX indicates that, when all the other variables are held constant, the price would increase by $e^{\text{0.0042054}}$ \approx 1.00421 (0.42%), with increasing size. The negative coefficient for TOWER shows that, when all the other variables are held constant, after the installation of a

CPBS in Beckenham, the price of a house would decrease by $e^{-0.25019} \approx 0.793$ (20.7% decrease).

Significance of Variables and the Equation: Bishopdale

The same functional form used for the other three suburbs was used for Bishopdale. From the regression output, the variables ROOFCNX and CATGYX were found to be insignificant so these were removed from the model and the regression was rerun; Appendix VIII summarizes these results. The F-statistic (122) shows that the estimated relationship in the model is statistically significant at the 95% confidence level and that at least one of the coefficients of the independent variables within the model is not zero.

Table 7 Test Statistics — Bishopdale

	Adjusted R ²	AIC	BIC
Full Model	0.79	-927.48	-775.71
Sub Model	0.79	-929.32	-796.52

Table 7 summarizes the model selection test statistics. Based on the AIC and BIC, the regression that excludes the variable ROOFCNX and CATGYX is superior to the regression that includes it (AIC and BIC are minimized). For this reason, the model excluding these variables was selected for analysis.

Again, the most significant variables were TIMESOLD.Q and MATFAX; the variable of interest, TOWER, was not a significant variable in the model so it is not discussed further. The former two variables have a positive influence on price. The positive TIMESOLD.Q indicates that the market was increasing over time since the CPBS was built in 1994, but only at 0.98% per quarter. The positive coefficient for MATFAX indicates that, when all the other variables are held constant, the price would increase by $e^{0.0059665}$ ≈ 1.004 (0.40%), with increasing size.

Summary of Results

The above analysis shows that the most significant variables and their impact on price were similar between suburbs. This indicates the relative stability of the coefficients between each model. Interestingly, the impact of TOWER on price (a decrease of between 20.7% and 21%) was very similar in the two suburbs where the towers were built in the year 2000. This may be due to the much greater media publicity given to CPBSs after the two legal cases in Christchurch (McIntryre and Shirley Primary School

in 1996 and 1999, respectively). The two suburbs where TOWER was either insignificant or increased prices by around 12%, were suburbs where towers had been built in 1994, prior to the media publicity.

Limitations of the Research

The main limitation affecting this survey was in the selection of the case study areas. Specifically, the areas selected had CPBSs that were not highly visible to residents. If more-visible CPBSs had been selected, the results may have been quite different. Thus, caution must be used in making generalizations from this study or applying the results directly to other similar studies or valuation assignments. Factors that could affect results are the distance of homes from the CPBS, the style and appearance of the CPBS, how visible the CPBS is to residents, the type of home (single family, multifamily, rental, etc.), and the socioeconomic make-up of the resident population.

To help address the proximity factor, a study is in progress examining the role of distance to the CPBSs and price effects; that study uses GIS analysis to determine the impact this has on residential property prices. It is expected that this will provide a more precise estimation of the impact of a CPBS on price.

It must be kept in mind that these results are the product of only one case study carried out in a specific area (Christchurch) at a specific time (2003). The above results indicate that value effects from CPBSs may vary over time as market participants' perceptions change. Perceptions toward CPBSs can change either positively or negatively over time. For example, as the World Health Organization's ten-year study of the health effects from CPBSs is completed and becomes available, consumers' attitudes may become more positive or negative depending on the outcome of that study. Consequently, studies of the price effects of CPBSs need to be conducted over time.

Areas for Further Study

This research has focused on residents' perceptions of negative effects from proximity to CPBSs and how these impact property values, rather than the scientific or technological estimates of these risks. The technologists' objective view of risk is that risk is measurable solely in terms of probabilities and severity of consequences, whereas the public, while taking experts' assessments into account, view risk more subjectively, based on other factors. Further, the results of scientific studies about the health effects of radio frequency and microwave radiation from CPBSs are not consistent. Residents' perceptions and assessments of risk vary according to a wide range of psychological, social, institutional, and cultural processes, and this may explain why their assessments differ from those of the experts.

Given the public concerns about the potential risks arising from being located nearby a CPBS, it is important for future studies to focus more attention on the kinds of risks the public associates with CPBSs and the level of risk perceived. How far away from the CPBS do people feel they have to be to be safe? What CPBS design, size, and surrounding landscape would help CPBSs to be more publicly acceptable? What social, economic, educational, and other demographic variables influence how people perceive the risks from CPBSs? Do residents that are heavy users of cell phones have a different perception of CPBSs than residents who make little use of this technology? Are these perceived risks reflected in property values and to what extent? Do these perceived risks vary over time and to what degree?

Answers to these questions, if shared among researchers and made public, could lead to the development of a global database to assist appraisers in determining the perceived level of risk associated with CPBSs and other similar structures.59 Knowledge of the extent that these risks are incorporated into property prices and how they vary over time will lead to more accurate value assessments of properties in close proximity to CPBSs and other similar structures.

Summary and Conclusions

Focusing on four case study neighborhoods in Christchurch, New Zealand, this article presents the results from both an opinion survey and market sales analysis undertaken in 2003 to determine residents' perceptions towards living near a CPBS and how this may impact property prices. From the results, it appears that people who live close to CPBSs perceive the sites less negatively than those who live farther away.

The issue of greatest concern for survey respondents in both the case study and control areas is the impact of proximity to CPBSs on future property values. Overall, respondents would pay from 10%-19% less to over 20% less for a property if it were in close proximity to a CPBS.

The opinion survey results were generally confirmed by the market sales analysis using a hedonic house price approach. The results of the sales analysis show prices of properties were reduced by around 21% after a CPBS was built in the neighborhood. How-

^{59.} For example, high-voltage overhead transmission lines.

ever, this result varies between neighborhoods, with a positive impact on price being recorded in one neighborhood, possibly due to the CPBS being built in that suburb before any adverse media publicity about CPBSs appeared in the local Christchurch press.

Research to date reports no clearly established health effects from radio frequency emissions of CPBSs operated at or below the current safety standards, yet recent media reports indicate that people still perceive that CPBSs have harmful effects. Thus, whether or not CPBSs are proven to be free from health risks is only relevant to the extent that buyers of properties near CPBSs perceive this to be true. Even buyers who believe that there are no adverse health effects from CPBSs, knowing that other potential buyers might think the reverse, will probably seek a price discount for a property located near a CPBS.

The comments of survey participants indicate the ongoing concerns that residents have about CPBSs. There is the need to increase the public's understanding of how radio frequency transmitting facilities operate and the strict exposure-limit standards imposed on the telecommunication industry. As more information is discovered that refutes concerns regarding adverse health effects from CPBSs, and as information about the NZ safety standards are made more publicly available, the perception of risk may gradually change, eliminating the discounts for neighboring properties.

Sandy Bond, PhD, MBS, ANZIV, SNZPI, is a senior member of the New Zealand Property Institute (NZPI), a director on the Board of the International Real Estate Society, and a past president of the Pacific Rim Real Estate Society (PRRES). She was awarded the PRRES Achievement Award in 2002 and the NZ Institute of Valuers' Presidential Citation in 1997. Before commencing her academic career in 1991, she worked as an appraiser in both New Zealand and London, UK. Contact: dr_sandybond@yahoo.com

Ko-Kang (Kevin) Wang is a recent graduate from the University of Auckland and has been a tutor in the Statistics Department at the university. Wang has recently commenced doctoral studies in Australia.

Contact: Kevin.Wang@anu.edu.au

Acknowledgements

The authors thank Mark Dunbar of Telfer Young and Robert Albrecht of DTZ for sharing the results of their cell phone research on valuation impacts from proximity to CPBSs, and Maya Marshall, Project Administrator at Telecom NZ, and Rapheal Hilbron, Community Relations Manager at Vodafone NZ, for information about CPBS locations and environmental impacts from these.

Additional Reading

Appraisal Institute. Proposed USPAP Statement on Appraisal Standards-First Exposure Draft: Utilization of Statistical and Market Survey Techniques in Real Estate Research, Appraising, Counselling, and Consulting Assignments. Report of Task Group for the Development of Standards for Determining the Acceptability of Applications of Statistical and Market Survey Techniques to the Valuation of Real Property. Chicago: Appraisal Institute, 2000.

Burch, J. B., J. S. Reif, M. G. Yost, T. J. Keefe, and C.A. Pittrat. "Nocturnal Excretion of Urinary Melatonin Metabolite Among Utility Workers." Scand J Work Environ Health 24, no. 3 (1998): 183-189.

Christchurch City Council Web site, http:// www.ccc.govt.nz/index.asp.

Fesenko, E. E., V. R. Makar, E. G. Novoselova, and V. B. Sadovnikov. "Microwaves and Cellular Immunity: Effect of Whole Body Microwave Irradiation on Tumour Necrosis Factor Production in Mouse Cells." Bioelectrochem Bioenerg 49, no. 1 (1999): 29-35.

Khudnitskii, S. S., E. A. Moshkarev, and T. V. Fomenko. "On the Evaluation of the Influence of Cellular Phones on Their Users." [In Russian] Med Tr Prom Ekol 9 (1999): 20-24.

International Commission on Non-Ionizing Radiation Protection. "Health Issues Related to the Use of Hand-Held Radio Telephone and Base Transmitters." Health Physics 70, no. 4 (April 1996): 587-593.

International Commission on Non-Ionizing Radiation Protection. "Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (Up to 300 GHz)." Health Physics 74, no. 4 (April 1998): 494-522.

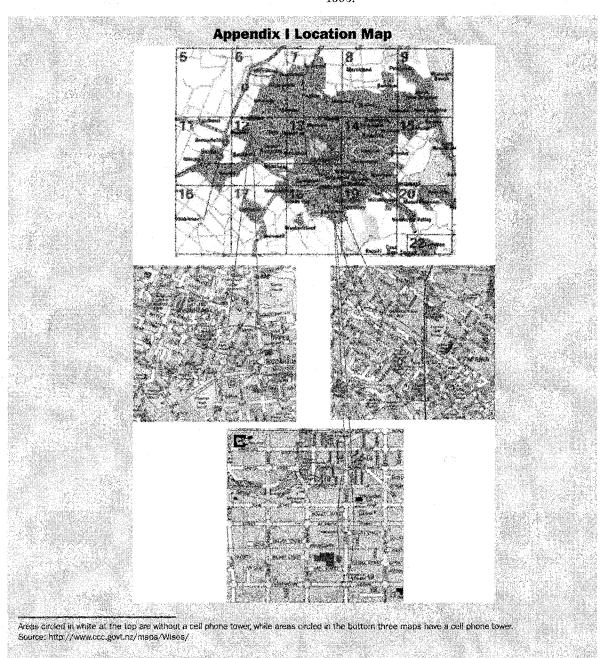
Priestley, T., and G. Evans. Perception of a Transmission Line in a Residential Neighbourhood: Results of a Case Study in Vallejo, California. San Francisco: Southern California Edison Environmental Affairs Division, December 1990.

Priestley, T., and P. C. Ignelzi. A Methodology for Assessing Transmission Line Impacts in Residential Communities. Washington, DC: Edison Electric Institute, June 1989.

Repacholi, M. H., A. Basten, V. Gebski, D. Noonan, J. Finnie, and A. W. Harris. "Lymphomas in E mu-Pim1 Transgenic Mice Exposed to Pulsed 900 MHZ Electromagnetic Fields." Radiat Res 147, no. 5 (1997): 631-640.

Royal Society of Canada. A Review of the Potential Health Risks of Radiofrequency Fields from Wireless Telecommunication Devices: An Expert Report Prepared at the Request of the Royal Society of Canada for Health Canada. Ottawa, Ontario: Royal Society of Canada, March 1999. http://www.rsc.ca//files/publications/ expert_panels/RF//RFreport-en.pdf.

World Health Organization. Electromagnetic Fields (300 Hz to 300 GHz). Environmental Health Criteria 137. Geneva: World Health Organization,



Variable	Responose		rcent (%)
Occupancy	Homeowner Tenant	Case Study 78.5 21.5	Contro 94.2 5.8
How long have you lived there?	Less than 6 months 6 months-1 year 1-4 years	8.0 8.6 25.1	2.6 4.5 27.7
	More than 5 years	58.3	65,2
How would you rate the desirability of your neighborhood?	Superior	27.4	30.9
	Above Average Average	37.4 28.5	36.8 27.0
	Below Average	5.6	4,6
	Inferior	1.1	0.7
Would you be opposed to construction of a cell phone tower nearby?	Yes No		72.1 27.9
When you purchased/began renting was the cell phone tower already constructed?	Yes No	39,3 60,7	
Was the proximity of the cell phone tower a concern to you?	Yes No	20,0 80.0	
Would you have gone ahead with rental/purchase if you had known a cell phone site was to be constructed?	Yes No	73.9 26.1	
Is location of a cell phone tower a factor you would consider when moving?	Yes No		83,4 16.6
Is the cell phone tower visible from your house?	Yes No	45.7 54.3	
If yes, how much does it impact on your view?	Very obstructive	9.6	
A CONTROL OF THE CONT	Mildly obstructive Barely noticeable	24.5 66.0	
In what way does it impact on the enjoyment of living in your house?	Views	11.8	
	Aesthetics	20.6	
	Health concerns Change in property value	36.8 19.9	
	Other	11.0	
Effect a nearby cell phone tower would have on the price/rent you	Tower wasn't constructed	53.1	Guarta
would pay for the property	Pay substantially more	0.0	0.0
	Pay a little more	2.3 2.8	0.0 37.6
	Pay a little less Pay substantially less	2.6 0.6	45.4
	Not influence price	51.4	17.0
% Effect a nearby cell phone tower would have on the price/rent you	20% higher or more	5	3.2
would pay for the property	10–19% more	10	1.6
	1–9% more 1–9% less	14 33	2,4 19.2
	10-19% less	24	36.0
	20% or a greater reduction	14	37.6
Concern about the possibility of harmful health effects in the future	Does not worry me	50.3	19.9
	Worries me somewhat	38.0	38.4
	Worries me a løt	11.7	41.7
Concern about the stigma associated with houses near the cell phone sites	Does not worry me Worries me somewhat	54.6 33.9	20,8 45.0
Month of the	Worries me a lot	აა.9 11.5	45.0 34.2
Concern about the affect on your properties value in the future	Does not worry me	61.3	15.4
	Worries me somewhat	25.4	37.2
	Worries me a lot	13.3	47.4
Concern about the aesthetic problems caused by the tower	Does not worry me	63.3	18.2
	Worries me somewhat	25.4	37.0

Appendix III Variable Codes

Category of Dwelling

1000	
Code	Definition
D	Dwelling houses are of a fully detached or semi-detached style situated on their own clearly defined piece of land.
Ε	Converted dwelling houses that are now used as rental flat.
F	Ownership home units which may be single storey or multi-storey and which do not have the appearance of dwelling houses.
Н	Home and income. The dwelling is the predominant use, and there is an additional unit of use attached to or associated with the dwelling house that can be used to produce income.
R	Rental flats that have been purpose built.

Quality of the Principal Structure

C	Code	Definition	1					1				
A	(Superior d	esign and d	quality of fir	xtures and	fittings is	i first clas	is.				
E	3	The design	is typical	of its era a	nd the qua	ality of the	fixtures a	and fittings	s is average	to good.		
C	}	The design	i is below t	he level ge	nerally exp	ected for	the era, c	or the leve	of fixtures	and fitting	ξs is bar	rely
		Carlos C. 902 (1) 3 16 70 77 15	e and noss	4.566 AV. 1. 15 CHEST 100								

Building Materials: Walls and Roof

Code	Definition
W	Wood
В	Brick
C	Concrete
S	Stone
R	Roughcast
F	Fibrolite
M	Malthoid
P	Plastic
13.	Iron
Α	Aluminium
G	Glass
Ť	Tiles
X	*
1	

	Appen	dix IV Des	criptive St	atistics		
Variable	Mean	Std. dev.	Median	Minimum	Maximum	Range
St Albans:					William St.	
Sale Price (\$)	221,957	110,761	200,000	42,000	839,000	797,000
Land Area (ha)	0.0658	0.0331	0.0579	0.0261*	0.3794	0.3533
Floor Area (m²)	161	70,40	150	50	450	400
Beckenham:						
Sale Price (\$)	116,012	50,037	111,000	21,500	385,000	363,500
Land Area (ha)	0.0601	0.0234	0.0553	0.0164*	0.2140	0.1976
Floor Area (m²)	115	32.50	110	40	340	300
Papanul:						
Sale Price (\$)	127,661	51,114	119,000	43,000	375,000	332,000
Land Area (ha)	0.0685	0.0289	0.0675	0.0310	0.3169	0.2859
Floor Area (m²)	122	34.60	110	56	290	234
Bishopdale:						
Sale Price (\$)	136,786	41,390	134,500	56,000	342,000	286,000
Land Area (ha)	0.0679	0.0163	0.0653	0.0400	0.2028	0.1628
Floor Area (m²)	125	31.20	118	64	290	226

Appendix V Regression Model: St Albans

log(SLNETX) = TOWER + CATGYX2 + CATGYX4 + TIMESOLD Q + AGE + log(LANDAX) + MATFAX + SITSTX

Residuals:	Min -0.72855	1Q ∙0.15032	Median 0.01593	3Q 0.14263	Max 0.72047
	-V.120JU				1.00
Coefficients:		Estimate	Std. Error	t-value 13.559	Pr(> t) < 2e-16 ***
(Intercept)		9.1781868	0.6769096		
TOWER		0.1133186	0.0318188	3,561	0.000395 ***
CATGYX2D		0.1846417	0.0702520	2.628	0.008776 **
CATGYX20		0.0334663	0.1008594	0.332	0.740134
CATGYX4B		-0.1551409	0.0245485	-6,320	4.75e-10 ***
CATGYX4C		-0.1483169	0.0722959	-2.052	0.040600 *
TIMESOLD.Q		0.0136663	0.0008208	16.650	< 2e:16 ***
AGE	F	0.0016408	0.0003521	4.660	3.81e-06 ***
log(LANDAX)		0.3285367	0.0283610	11.584	< 2e-16 ***
MATFAX		0.0022314	0.0001962	11.373	< 20-16 ***
SITSTXAIKMANS RD		0,4029259	0.0533671	7.550	1.41e-13 ***
SITSTXBEVERLEY ST		0.2330787	0.0803137	2.902	0.003827 **
SITSTXBRISTOL ST		0.1706840	0.0521716	3.272	0.001124 **
SITSTXBROWNS RD		0.2492536	0.0720854	3.458	0.000579 ***
SITSTXCOX ST		0.3055798	0.0581672	5,253	2.00e-07 ***
SITSTXGORDON AVE		0.0823422	0.0679833	1.211	0.226236
SITSTXKNOWLES ST		0.1690979	0.0558911	3.025	0.002576 **
SITSTXMANSFIELD AVE		0.2954242	0.0652983	4.524	7.16e-06 ***
SITSTXMCDOUGALL AVE		0.3303105	0.0623720	5.296	1.60e-07 ***
SITSTXMURRAY PL		0.3613773	0.0629166	5.744	1.40e-08 ***
SITSTXOFFICE RD		0.3681146	0.0543368	6.775	2.71e-11 ***
SITSTX Other		0.0618491	0.0736629	0.840	0.401416
SITSTXPAPANUI RD		0.1940369	0.0560474	3.462	0.000570 ***
SITSTXRANFURLY ST		0.1701716	0.0617504	2.756	0.006012 **
SITSTANTI UNLI SI		0.1458665	0.0571172	2.554	0.010873 *
SITSTXWEBB ST		0.1895432	0.0725061	2.614	0.009143 **
SITSTXWESTON RD		0.2084419	0.0527555	3.951	8.60e-05 ***

Signif, codes: 0 **** 0.001 *** 0.01 ** 0.05 **0.1 ** 1. Residual standard error: 0.2175 on 677 degrees of freedom Multiple R-Squared: 0.8253, Adjusted R-squared: 0.8186 F statistic: 123 on 26 and 677 DF, p-value: < 2.2e-16

Appendix VI Regression Model: Papanui
In(formula = log(SLNETX) ~ TOWER + SITSTX + TIMESOLD.Q + AGE + log(LANDAX) + MATFAX + WALLCNX + ROOFCNX + CATGYX4, data = Papanui final)

Residuals:	Min -0.484987	1Q -0.098006	Median 0.003859	3Q 0.106253	Max 0.563126
Coefficients:		Estimate	Std. Error	t-value	Pr (> t)
(Intercept)		5.9482316	0.6998186	8,500	< 2e-16 ***
TOWER		-0.2339640	0.0240908	-9.712	< 26-16 ***
SITSTXHOANI ST		-0.1966982	0.0265429	-7.411	4.26e-13 ***
SITSTXLANGDONS RD		-0.1192547	0.0281242	-4.240	2.58e-05 ***
SITSTXLEANDER ST		0,0305555	0.0449437	0.680	0.496853
SITSTXMATSONS AVE		0.0949636	0.0292461	3.247	0.001231 **
SITSTXMORELAND AVE		-0.0892332	0.0397622	-2.244	0.025183 *
SITSTXMORRISON AVE		-0.1984492	0.0289772	-6.848	1.84e-11 ***
SITSTXOther		0.1543194	0.0337436	-4.573	5.83e-06 ***
SITSTXSAILS ST		-0.0761412	0.0433455	-1.757	0.079490
SITSTXSAWTELL PL		0,1840793	0.0393904	4,673	3.66e-06 ***
SITSTXSAWYERS ARMS	S RD	0.0872393	0.0201388	4,332	1.73e-05 ***
SITSTAST JAMES AVE		0.2497688	0.0289940	8.615	< 2e-16 ***
TIMESOLD.O		0.0138914	0.0004137	33.575	< 2e-16 ***
AGE		0.0029307	0.0003512	8.345	4.85e-16 ***
log(LANDAX)		0.0904764	0.0270812	3.341	0.000886 ***
MATFAX		0.0042576	0.0002410	17.664	< 2e-16 ***
WALLENXC		0.0054100	0.0200666	0.270	0.787558
WALLCNXF		-0.0980851	0.0464442	-2.112	0.035106 *
WALLCNXO		-0.1158407	0.0468334	-2:473	0.013655 *
WALLCNXR		-0.0670051	0.0244382	-2.742	0.006291 **
WALLCNXW		-0.0679166	0.0192628	3,526	0.000454 ***
WALLCNXX		-0.0571365	0.0358369	-1.594	0.111381
ROOFGNXI		0.1502973	0.1139845	1.319	0.187810
ROOFCNXO		0.0870092	0.1164152	0.747	0.455111
ROOFCNXT		0.0954874	0.1.138506	0.839	0.401965
CATGYX4B		-0.0623758	0.0343487	-1.816	0.069872.
CATGYX4C		-0.3669901	0.0905659	-4.052	5.74e-05 ***

Signif. codes: 0 '**** 0.001 '*** 0.01 '* 0.05 '. 0.1 ' 1 Residual standard error: 0.1579 on 604 degrees of freedom Multiple *R*-Squared: 0.8718, Adjusted *R*-squared: 0.8661 F-statistic: 152.2 on 27 and 604 DF, p-value: < 2.2e-16

Appendix VII Regression Model: Beckenham

 $In(formula = log(SLNETX) \sim TOWER + SITSTX + CATGYX4 + TIMESOLDQ + AGE + log(LANDAX) + MATFAX + WALLCNX + CATGYX2, data = Beckenham.final)$

Residuals:	Min 1Q -0.64490 -0.09026	Median 0.01142	3Q 0.10112	Max 0.40993
A		Std. Error	t-value	Pr(> t)
Coefficients:	Estimate	0.4725194	19.483	<2e-16 ***
(Intercept)	9.2062865	0.4725194	12.594	< 2e-16 ***
TOWER1	-0.2301918			0.001436 **
SITSTXBECKENHAM ST	0.1648069	0.0515406	3.198 -1.272	
SITSTXBOON ST	-0.0616738	0.0484966		0,203817
SITSTXBRADFORD AVE	0.0923843	0.0494942	1.867	0.062300.
SITSTXCOLOMBO ST	0:0623765	0.0467234	1.335	0.182223
SITSTXDEVON ST	-0.0959430	0.0457562	-2,097	0.036299 *
SITSTXDUNN ST	-0.0207886	0.0427676	-0.486	0.627031
SITSTXFISHER AVE	0.2271245	0.0400288	5.674	1.90e-08 ***
SITSTXLONGFELLOW ST	-0.0186953	0.0451597	-0.414	0.678990
SITSTXOTHER	-0.0222126	0.0467607	-0,475	0.634888
SITSTXPERCIVAL ST	-0.0347190	0.0517740	-0.671	0.502663
SITSTXROXBURGH ST	0.1029109	0.0466753	2.205	0.027729 *
SITSTXSOMERFIELD ST	0.0186495	0.0428968	0.435	0.663851
SITSTXSOUTHAMPTON ST	-0.0243265	0.0402926	-0.604	0.546171
SITSTXSOUTHEY ST	-0.0324513	0.0429880	-0.755	0.450520
SITSTXSTRICKLAND ST	-0.0819418	0.0407196	-2.012	0.044494 *
SITSTXTENNYSON ST	0.1165007	0.0393410	2.961	0.003147 **
SITSTXWEMBLEY ST	0.0648226	0.0458033	1.415	0.157359
CATGYX4B	0.0275481	0.0373405	0.738	0.460864
CATGYX4C	0.1168640	0.0469787	-2.488	0.013049 *
TIMESOLD.O	0.0189904	0.0003396	55,928	< 26-16 ***
AGE	0.0010988	0.0002426	4.530	6.74e-06 ***
log(LANDAX)	0.1546535	0.0195655	7.904	8.19e-15 ***
MATFAX	0.0042054	0.0002138	19.674	< 2e-16 ***
WALLCNXC	-0.0208433	0.0378338	-0.551	0.581833
WALLONXE	-0.0206433 -0.1171637	0.0394091	-0.331	0.003031 **
	-0.0445073	0.0394091	-2.973 -1.113	0.265849
WALLCNXO				2.41e-06 ***
WALLCNXR	0.1119164	0.0235736	4,748	
WALLCNXW	-0.0629968	0.0222366	-2.833	0.004718 **
WALLCNXX	0.0992564	0.0398493	-2.491	0.012933 *
CATGYX2D	0.1445276	0.0399650	3.616	0.000316 ***
CATGYX2F	0.3069113	0.0744524	4.122	4.11e-05 ***
CATGYX2R	0.2927391	0.1222453	2.396	0.016847 *

Signif, codes:0 *** 0.001 ** 0.01 * 0.05 * 0.1 1 1 Residual standard error: 0.1515 on 864 degrees of freedom Multiple R-Squared: 0.8911, Adjusted R-squared: 0.8669 F-statistic: 214.2 on 33 and 864 DF, p value: < 2.2e-16

Appendix VIII Regression Model: Bishopdale
In(formula = log(SLNETX) ~ TOWER + TIMESOLD.Q + AGE + log(LANDAX) + MATEAX + WALLCNX + SITSTX, data = Bishopdale.final)

Residuals:	Min -0.53633	1Q -0.08893	Median 0:01446	3Q 0.08850	Max 0.49048
Coefficients:		Estimate	Std. Error	t-value	Pr(> t))
(Intercept)		9.0005033	0.6988891	12.878	< 26.16 ***
TOWER		0.0262575	0.0182796	1.436	0.151259
TIMESOLD.Q		0.0097887	0.0004834	20.251	< 2e-16 ***
AGE		0.0013236	0.0003598	3.679	0.000249 ***
log(LANDAX)		0.1357753	0.0333622	4.070	5,16e-05 ***
MATFAX		0.0039665	0.0001855	21.389	< 2e-16 ***
WALLENXC		-0.0169935	0.0108641	-1.564	0.118160
WALLCNXO		0.0785660	0.0336688	2.333	0.019863 *
WALLCNXR		-0.0693225	0.0300511	-2.307	0.021313 *
WALLCNXW	400	-0.0815023	0.0230110	-3.542	0.000420 ***
SITSTXCARDOME ST		0.0610536	0.0314227	1.943	0.052360.
SITSTXCHEDWORTH AVE		0.0330487	0.0317738	1.040	0.298589
SITSTXCLOTILDA PL		0.2252988	0,0420078	5.363	1.06e-07 ***
SITSTXCOLESBURY ST		0.0528749	0.0302668	1,747	0.081018.
SITSTXCOTSWOLD AVE	Silver -	0.0604953	0.0286474	2.112	0.035012 *
SITSTXEASTLING ST		0.0551537	0.0319833	1.724	0.085003 .
SITSTXFARRINGTON AVE		-0.0001768	0.0238544	-0.007	0.994087
SITSTXHAREWOOD RD		0.0204412	0.0252674	0.809	0.418753
SITSTXHIGHSTED RD		0.0391760	0.0253953	1.543	0.123302
SITSTXKILBURN ST		-0.0176756	0.0366951	-0.482	0.630155
SITSTXKINGROVE ST		-0.0052772	0.0375965	-0.140	0.888406
SITSTXLEACROFT ST		0.1058243	0.0333633	3.172	0.001571 **
SITSTXMURMONT ST		0.1825316	0.0365287	4.997	7.12e-07 ***
SITSTXNEWMARK ST		-0.0342136	0.0272490	-1.256	0.209621
SITSTXOTHER		0.0525437	0.0253634	2.072	0.038612 *
SITSTXRALEIGH ST		0.0470151	0.0314032	1.497	0.134740
SITSTXSTACKHOUSE AV	.	0.0235719	0.0278844	-0.845	0.398165

Signif, codes:0 '*** 0.001 *** 0.01 '* 0.05 ' 0.1 ' 1 Residual standard error: 0.137 on 821 degrees of freedom Multiple R-Squared: 0.7946, Adjusted R-squared: 0.7881 F-statistic: 122.1 on 26 and 821 DF, p-value: < 2.2e16



CELLULAR PHONE TOWERS: PERCEIVED IMPACT ON RESIDENTS AND PROPERTY VALUES

SANDY BOND University of Auckland

and

KAREN BEAMISH Jones Lang LaSalle

ABSTRACT

This paper outlines the results of a case study to determine residents' perceptions towards living near cellular phone base stations (CPBSs) in Christchurch, New Zealand and how they evaluate the impact of these structures. The results provide initial evidence that if used together with the results from econometric analysis of transaction data can help resolve valuation and compensation issues in a quantitative way. Further, they provide a potential source of information for related government agencies in assessing the necessity for increasing health and other information pertaining to CPBSs to help allay public concerns.

Keywords: Electromagnetic fields, radio frequency & microwave radiation, cellular phone base stations, property values, stigma.

INTRODUCTION

Cellular phone base stations (CPBSs) are increasingly in demand as the two major cellular phone companies in New Zealand (NZ), Telecom and Vodafone, seek to upgrade and extend their network coverage. This demand could provide the owner of a well-located property a yearly income for the siting of a CPBS¹. However, as CPBSs and associated equipment increase the exposure of the population to electromagnetic fields (EMFs) the new technology represents potential hazards to human health and safety. This may cause property values to diminish due to the existence of "widespread public fear" and "widespread public perceptions of hazards". The increased media attention to the potential health hazards of CPBSs has caused a spread of such fear with a resulting increase in

158

Williams, R. "Phone zone – renting roof space to Ma Bell," The Property Business (12, April 2001): 6-7.

resistance to CPBSs due to the perceived negative effects on health, aesthetics and property values in close proximity to these structures. However, the extent to which such attitudes are reflected in lower property values affected by CPBSs is not widely known in NZ.

Understanding the effects of CPBSs on property values is important to telecommunications companies in helping plan the siting of these and for determining likely opposition from property owners. Similarly, property valuers need to understand the valuation implications of CPBSs when valuing CPBSs-affected property. The owners of affected property also want to understand the magnitude of effects, particularly if compensation claims or an award for damages are to be made against such property.

Two studies have been conducted (commissioned by Telecom in Auckland (1998/99) and Christchurch (2001)) to ascertain the adverse health and visual effects of CPBSs on property values, but these have not been made publicly known. Although the results reported by Dunbar and Albrecht (2002)² showed that property prices are not statistically significantly affected by the presence of CPBSs, the research in both cases involved only limited sales data analysis. Further, no surveys of residents' perceptions were undertaken, nor of the media attention to the sites and the effect this may have on saleability of properties in close proximity to CPBSs. Finally, as the sponsoring party to the research was a telecommunication company, it is questionable whether the results are completely free from bias. Hence, this initial study aims to help fill the research void on this contentious topic in an objective way. The research develops a case study approach to determine residents' perceptions towards living near CPBSs in several suburbs in Christchurch and to quantify these effects in monetary terms according to an increasing or decreasing percentage of property value.

The paper provides a brief review of the use of cellular phone technology in NZ and relevant literature. The following section describes the research procedure used, including a description of both case study and control areas. The results are then discussed. The final section provides a summary and conclusion.

LITERATURE REVIEW

Background: cellular phone technology in NZ

The cellular telephone service first became available in New Zealand in 1987. This figure has continued to balloon in recent years. It is estimated that 80 percent of people will be mobile within five years (Telecom, 2002)³. The location of cell sites and cell site capacity

² In personal correspondence with Bond.

³ At the end of March 2002, Telecom had more than 1.3 million mobile phone customers and more than 750 mobile phone sites throughout New Zealand (a 54% share of the mobile market) Vodafone had over 1.1 million mobile phone customers throughout New Zealand (a 46% share of the mobile market), (Vodafone, 2002).

is a major issue that the telecommunication companies are faced with at present. Despite the high level of demand from customers for better cell phone coverage in areas where they live and work, the majority of them do not want a site in their neighbourhood. Concerns expressed usually relate to health, property values and visual impact (Szmigielski and Sobiczewska, 2000; Barnes, 1999).

For service providers, the preferred location for cell sites is in commercial or industrial areas due to the previous difficulty in obtaining resource consent for towers located in residential areas under the Resource Management Act⁴. Under the Resource Management Act 1991 (RMA), resource consent may be required in prescribed circumstances from the local council to establish a cell site in the area. This may be either notified or non-notified. If the council decides it is to be notified, this allows anyone in the community to have their say about it. One of the positive outcomes of the RMA resource consent procedure is the resulting unobtrusive nature of most cell sites. Some sites have even been incorporated into clock towers, building's chimneys and building signage.

Assessment of environmental effects Adverse health effects

The analog phone system (using 800-900 Megahertz band) and digital phone system (using 1850-1990 Megahertz band) expose humans to EMF emissions: radio frequency radiation (RF) and microwave radiation (MW) respectively. These two radiations are emitted from both the cellular phones and CPBSs (Barnes, 1999; Szmigielski and Sobiczewska, 2000).

For years, the cell phone companies have assured the public that cell phones are perfectly safe. They state that the particular set of radiation parameters associated with cell phones are the same as any other radio signal. However, reported scientific evidence challenges this view and shows that cell phone radiation causes various biological effects, including: cancer, specifically brain tumours and leukaemia; altered brain activity; disturbed sleep; significant changes in local temperature, and in physiologic parameters of the cardiovascular system; memory loss, fatigue, and headaches, raised blood pressure, etc⁵.

The main health concerns relating to EMF emissions from CPBSs are caused by the fact that RF fields penetrate exposed tissues. RF energy is absorbed in the body and produces heat. All established health effects of RF exposure are clearly related to heating. Public concern regarding both cell phones and CPBSs in many countries has led to a number of independent expert groups being requested by governments and cellular service providers to carry out detailed reviews of the research literature. The reviews conclude that there are

⁴ This has now been amended and replaced with a much simply consent process.

⁵ Mann & Roschkle (1996), Krause et al. (2000), Borbely et al. (1999), Kellenyi et al. (1999), Khdnisskil, Moshkarev & Fomenko (1999), Hocking (1998), Burch et al. (1998) and others as reported in Cherry, N. (2000).

no clearly established health effects under low levels of exposure. Such exposures typically occur in publicly accessible areas around RF transmitters⁶.

While, at present, medical and epidemiological studies reveal weak association between bio-effects and low-level exposures of RF/MW fields, controversy remains between scientists, producers and the general public.

Radio frequency exposure standards

Despite ongoing controversy, the reviews of research on the health effects of exposure to RF helped establish the basis for exposure standards that limit exposures to a level for safe and healthy living and working conditions. The NZ Standard for RF exposures, NZS 2772.1:1999 Radiofrequency Fields Part I: Maximum Exposure Levels – 3kHz to 300GHz was based largely on the widely accepted and respected 1998 International Commission on Non-Ionising Radiation Protection (ICNIRP) guidelines.

Currently, the NZ standard sets out a limit of continuous exposure to the public for RF levels from mobile phone sites of 450 microwatts per square centimetre. This standard is the same as used in most European countries, and is more stringent than that used in the United States, Canada and Japan. This exposure level has been lowered even further in some cases. For example, the Christchurch City Council has made their allowable standard 200 microwatts per square centimetre (less than 50% of the NZ Standard). In reality however, mobile phone sites only operate at a fraction of the level set by the standard. The National Radiation Laboratory has measured exposures around many operating cell sites. Maximum exposures in publicly accessible areas around the great majority of sites are less than 1% of the public exposure limit in the standard. Exposures are rarely more than a few percent of the limit, and none have been above 10%.

NZ legal cases on property values effects from CPBSs

Very few cell site cases have actually proceeded to Environment Court hearings in NZ. The two main court cases were McIntyre and others vs. Christchurch City Council [1996] NZRMA 289 and Shirley Primary School vs. Telecom Mobile Communications Ltd [1999] NZRMA 66. Based on these cases, there are two main alleged adverse effects of CPBSs on property values: the risk of adverse health effects from RF radiation emitted from CPBSs and the adverse visual effects.

In McIntyre and others vs. Christchurch City Council, Bell South applied for resource consent to erect a cell phone base station in the suburb of Fendalton in Christchurch. Residents' objected to the application based on the harmful health effects from RF

⁶ See for example, The New Zealand Radiation Laboratory (2001), the World Health Organization (1993), International Commission on Non-Ionizing Radiation Protection (ICNIRP) (1997, 1998), the Royal Society of Canada (1999) and the UK Independent Expert Group on Mobile Phones (2000).

radiation. The Planning Tribunal considered residents' objections and heard experts' opinions as to the potential health effects, and granted the consent, subject to conditions. It was found that there would be no adverse health effects from low levels of radiation from the proposed transmitter, not even effects of low probability but high potential impact.

In Shirley Primary School vs. Telecom Mobil Communication Limited, Telecom applied to the Christchurch City Council for resource consent to establish, operate and maintain a CPBS on land at Shirley Road, Christchurch, adjacent to the Shirley Primary School. Again, the Council granted the consent subject to conditions. However, the school appealed the decision, alleging four main adverse effects, as follows:

- The risk of adverse health effects from the radio frequency radiation emitted from the cell site
- The school's perception of the risks and related psychological adverse effects on pupils and teachers
- Adverse visual effects
- Reduced financial viability of the school if pupils were withdrawn because of the perceived adverse health effects.

The Court concluded that the risk of the school children or teachers at the school incurring leukaemia of other cancer from RF radiation emitted by the cell site is extremely low, and the risk to the pupils of exposure to RF radiation causing sleep disorders or learning disabilities is higher but still very small. Accordingly, the Telecom proposal was allowed to proceed.

In summary, the Environmental Court has ruled that there is no established adverse health effects arising from the emission of radio waves from CPBSs as there is no epidemiological evidence to show this. The court was persuaded by the 1998 ICNIRP guidelines that risk of health effects from low-level exposure is very low and that the cell phone frequency imposed by the NZ standard is safe, being almost two and a half times lower than that of the ICNIRP.

However, in the court's decisions, they did concede that while there is no proven health affects that there is evidence of property values being affected by both of the above allegations. Yet they suggest that such a reduction in property values should not be counted as a separate adverse effect from, for example, adverse visual or amenities effects. That is, a reduction in property values is not an environmental effect in itself; it is merely evidence, in monetary terms, of the other adverse effects noted.

In Chen vs. Christchurch City Council, the court stated that valuation is simply another expert opinion of the adverse effect (loss). Further, in this case the court established a precedent relating to the effects on property values. In Goldfinch vs. Auckland City Council (NZRMA 97), the Planning Tribunal considered evidence on potential losses in value of the properties of objectors to a proposal for the siting of a CPBS. The Court concluded that the valuer's monetary assessments support and reflect that the adverse

effects of the CPBS. Further, it concluded that the effects are more than just minor as the CPBS stood upon the immediately neighbouring property.

Research on property value effects

Few studies have been conducted to ascertain the adverse health and visual effects of CPBSs on property values. Further, as there has been very few cell site cases proceeding to the Environment Court, little evidence of property value effects has been provided by the courts. Thus, the extent to which opposition from property owners affected by the siting of CPBSs are reflected in lower property values is not well known in New Zealand.

The two studies by Dunbar and Albrecht, mentioned earlier, whilst showing that property prices are not statistically significantly affected by the presence of CPBSs involved only limited sales data analysis with potentially biased results due to the financial interest Telecom had in the research.

CPBSs are very similar structures to high voltage overhead transmission lines (HVOTLs), therefore despite the limited research relating to value effects from CPBSs, it is worthwhile reviewing the body of literature on the property values effects from HVOTLs. The only recently published study in NZ on HVOTLs effects is Bond and Hopkins (2000). Their research consisted of both a regression analysis of residential property transaction data in a case study area to determine the effect of HVOTLs on residential property values and an opinion survey to determine the attitudes and reactions of property owners in the case study area toward living close to HVOTLs and pylons.

The results of the sales analysis indicate the effect of having a 'pylon' close to a particular property is statistically significant and has a negative effect of 20% at 10-15 metres from the pylon, decreasing to 5% at 50 metres. This effect diminishes to a negligible amount after 100 metres. However, the presence of a 'transmission line' in the case study area has a minimal effect and is not a statistically significant factor in the sales price.

The attitudinal study results indicate that nearly two thirds of the respondents have negative feelings about the HVOTLs. Proximity to HVOTLs determines the degree of negativity: respondents living closer to the HVOTLs expressed more negative feelings towards them than those living further away. It appears, however, from a comparison of the results, that the negative feelings expressed are often not reflected in the price paid for such property.

There have been a number of HVOTLs studies carried out in the United States and Canada. A major review and analysis of the literature by Kroll and Priestley (1992) indicated that in about half the studies carried out, HVOTLs had not affected property values and in the rest of the studies, there was a loss in property value between 2-10%. Kroll and Priestley found that the Colwell (1990) study was one of the more careful and systematic analysis of residential impacts. This study was carried out in Illinois and found that the strongest effect of the HVOTLs was within the first 15m but with this dissipating

quickly further away, disappearing beyond 60m.

A Canadian study (Des Rosiers, 2002) based on a sample of 507 single-family house sales showed that although severe visual encumbrance due to a direct view of either a pylon or lines exerts a significantly negative impact on property values, a house located adjacent to a transmission corridor may increase in value. This was particularly evident where the transmission corridor was on a well wooded 90m right of way. The proximity advantages include enlarged visual field and increased privacy. The decrease in value from the visual impact of the HVOTLs and pylons (between, on average, 5-10% of mean house value) tends to be cancelled out by the increase in value from proximity to the easement.

A study by Wolverton and Bottemiller (2003) utilized a paired-sale methodology of home sales occurring in 1989-1992 to ascertain any difference in sale price between properties abutting rights-of-way of transmission lines (subjects) in Portland, Oregon; Vancouver, Washington; and Seattle, Washington and those located in the same cities but not abutting transmission line rights-of-way (comparisons). Subjects sold during the study period were selected first. Then a matching comparison was selected from the subject neighbourhood that was as similar to the subject as possible. Their results did not support a finding of a price effect from abutting an HVTL right-of-way. In their conclusion, they warn that the results cannot and should not be generalized outside of the data. They explain that "limits on generalizations are a universal problem for real property sale data because analysis is constrained to properties that sell and sold properties are never a randomly drawn representative sample. Hence, generalizations must rely on the weight of evidence from numerous studies, samples, and locations".

Thus, despite the varying results reported in the literature on property value effects from HVOTLs, each study adds to the growing body of evidence and knowledge on this (and similar) valuation issue(s). The study reported here is one such study.

DATA COLLECTION AND ANALYSIS

Research objectives and methodology

An opinion survey was conducted to investigate the current perceptions of residents towards living near CPBSs and how this proximity might affect property values. Case study areas in the city of Christchurch, NZ were selected for this study. The study included residents in ten suburbs: five case study areas (within 300 metres of a cell phone tower) and five control areas (over 1km from the cell phone tower). The five case study suburbs were matched with five control suburbs that had similar living environments (in socio-economic terms) except that the former were areas where a CPBS is located, while the latter were without a CPBS.

The number of respondents to be surveyed (800) and the nature of the data to be gathered (perceptions/personal feelings towards CPBSs) governed the choice of a self-administered

questionnaire as the most appropriate collection technique. Questionnaires were mailed to residents living in the case study and control areas.

A self-administered survey helps to avoid interviewer bias and to increase the chances of an honest reply where the respondent is not influenced by the presence of an interviewer. Also, mail surveys provide the time for respondents to reflect on the questions and answer these at their leisure, without feeling pressured by the time constraints of an interview. In this way, there is a better chance of a thoughtful and accurate reply.

The greatest limitation of mail surveys is that a low response rate is typical. Various techniques were utilised to help overcome this, including careful questionnaire design; inclusion of a free-post return envelope, an accompanying letter ensuring anonymity, and reminder letters. An overall response rate of 46% was achieved for this study.

The questionnaire contained 43 individual response items. The first question acted as an identifier to determine whether the respondent was the homeowner or tenant. While responses from both groups were of interest, the former was of greater importance, as they are the group of purchasers/vendors that primarily influence the value of property. However, it was considered relevant to survey both groups as both are affected by proximity to a CPBS to much the same extent from an occupiers' perspective, i.e. they both have to live with the knowledge, and perceived risks associated with a CPBS. It was hypothesised, however, that tenants, being of a less permanent nature, would perceive the effects in a similar way, but to a much lesser degree.

Other questions relate to overall neighbourhood environmental desirability, the timing of the CPBS's construction and the proximity of it in relation to the respondent's home, the importance they place on the CPBS as a factor in relocation decisions and on the price/rent they were prepared to pay for their house, how a CPBS might affect the price they would be willing to pay for their property; the degree of concern of the effects of CPBSs on health, stigma, aesthetics, property values, etc.

The surveys were coded to identify the property address of each. This enabled each respondent's property to be located on a map and to show this in relation to the cell site. Eighty questionnaires were distributed to each of the ten suburbs (five case study and five control areas) in Christchurch (i.e. 800 surveys were delivered in total). Homes were selected in the case study area based on being with 300 metres of the CPBS. Control group homes within each selected suburb were selected at random. Respondents were instructed to complete the survey and return it in the free-post, self-addressed envelope provided. The initial response rate was 31%. A month later, a further 575 questionnaires with reminder letters were sent out to residents who had not yet responded. A total response rate of 46% was achieved. Response rates from each suburb ranged from 33% (Linwood) to 61% (Bishopdale).

The questionnaire responses were coded and entered into a computerised database.⁷ The analysis of responses included the calculation of means and percentage of responses to each question to allow for an overview of the response patterns in each area.

Case study and control areas

The suburbs of Beckenham, Papanui, Upper Riccarton, Bishopdale and St Albans were selected as there is at least one CPBS erected within them. The control suburbs selected include Spreydon, Linwood, Bromley, Avonhead and Ilam. These were located further away (over 1 kilometre) from the CPBS within the case study area they were matched with. Each suburb was selected and matched to a comparable case study area based on it having a similar living environment, housing stock and socio-economic characteristics, but without a CPBS nearby.

Demographic statistics from the 2001 Census used to select and match the control areas to the case study areas included ethnic breakdown, household and family incomes, education and occupational type of residents in each suburb. Papanui and Spreydon have the highest proportion of Europeans (around 90%), Bromley has the highest proportion of both Maoris and Pacific Island people (13.9% and 8.5% respectively), while Ilam, Avonhead and Upper Riccarton have the highest proportion of Asians (16.1 to 18.5%)⁸.

The 2001 Census data on median household and family incomes (MHI and MFI) in each suburb show that these are highest in Ilam and Avonhead (MHI: \$34,751NZ to \$53,405NZ and MFI: \$51,530NZ to \$65,804NZ, respectively) and lowest in Linwood and Beckenham (MHI: \$22,275NZ, \$26,398NZ and MFI: \$29,673NZ, \$33,847NZ respectively). Residents of St Albans West have the highest levels of education (21.7 to 26.2% have a degree or higher degree) followed by Upper Riccarton (18.7%), Ilam (16.7%) and Avonhead (16.2%). These same suburbs have the highest proportion of professionals by occupational class (20.3 to 27.3%). Residents of Bromley have the lowest education (40% have no qualification) and the lowest proportion of professionals (5.5%). Residents of Bromley have the lowest education (40% have no qualification) and the lowest proportion of professionals (5.5%).

⁷ The computer programme SPSS was selected as the appropriate analytical tool for processing the data.

⁸ Christchurch City Area Unit Profile statistics from < http://www.ccc.govt.nz/census/Income.asp#AreaUnit >.

 $^{^{9}}$ \$1NZ = \$0.65US, thus, \$34,751NZ = \$22,588US.

The median house price for Christchurch city in August 2003 was \$185,000NZ/\$120,000US (New Zealand national median house price at this time was \$215,000NZ/\$140,000US), (http://www.reinz.co.nz/files/HousingFacts-Sample-Pg1-5.pdf, accessed on 17 March 2004). Median house prices in each individual suburb could not be obtained as the median sales data from the Real Estate Institute of NZ (REINZ) contains more than one suburb in each location grouping.

The matching process ensured that the case study and control areas had an even distribution of suburbs from both the higher and lower socioeconomic spectrums. The suburbs are listed in decreasing socioeconomic order as follows: Ilam, Avonhead, Upper Riccarton, St Albans West, Papanui, Spreydon, Bishopdale, Bromley, Beckenham and Linwood.

RESEARCH RESULTS

Survey 1: Cell Phone Tower Case Study Areas

Of the 400 questionnaires mailed to homeowners and tenants in the case study areas, 50% were completed and returned. Over three-quarters (78.5%, n=186) of the respondents were homeowners.

Desirability of the suburb as a place to live

More than half (58.3%, n=187) of respondents have lived in their suburb for more than five years and a quarter (25%) have lived in their suburb between 1-4 years. Nearly two-thirds (65%, n=179) rated their neighbourhood as either above average or superior as a place to live when compared with other similar named suburbs. The reasons given for this are due to the close proximity to amenities including shops, medical facilities, public transport, recreational facilities and good schools. Reasons given for the neighbourhood been rated as inferior to other similar neighbourhoods was due to lower house prices, older homes, more student housing and lower income residents.

Feelings towards the CPBS as an element of the neighbourhood

The CPBS was already constructed when only 39% (n=168) of the respondents bought their house or began renting in the neighbourhood. Some responded that were not notified that the CPBS was to be built, so they had no opportunity to object to it. They felt that they should have been consulted about this. For the respondents' that said the proximity of the tower was of concern to them, the most common reasons given were the effects of the CPBS on health, aesthetics and property values. Nearly three-quarters (74%, n=157) of the respondents said they would have gone ahead with the purchase or rental of their property anyway if they had known that the CPBS was to be constructed.

Effect on decision to purchase or rent

The tower was visible from the house of 46% (n=184) of the respondents, yet two-thirds (66%) of these said it was barely noticeable, and a quarter said it mildly obstructed their view. When asked in what way the CPBS impacts on the enjoyment of living in their home, over a third (37%, n=136) responded that it impacted on their health concerns, 21% on neighbourhood aesthetics, 20% on the property value and 12% on the views from their property. When asked about the effect that the CPBS had on the price/rent they were prepared to pay for their property, nearly a half (48.5%, n=195) said that the tower was not constructed at the time and 47% of the respondents said the proximity to the CPBS did

not affect the price they were prepared to pay for the property. Nearly 3% said they were prepared to pay a little less, 2% said they were prepared to pay a little more.

Ten percent (n=21) of the respondents gave an indication of the effect that the CPBS had on the price/rent they were prepared to pay for their property. A third of these felt it would decrease price/rent by between 1 to 9%. The responses are outlined in Table 1.

Table 1: Effect of the CPBS on Purchase/Rental Price Decision				
Price/Rent Effect (%)	% of Respondents			
20% more	5%			
10-19% more	10%			
1-9% more	14%			
1-9% less	33%			
10-19% less	24%			
20% or greater reduction in price/rent	14%			

Concerns about the proximity to the CPBS

Over half of the respondents were not worried about the effects that proximity to a CPBS has on health (50%, n=179), stigma (55%, n=174), future property value (61%, n=173) or aesthetics (63%, n=177). Around one quarter to a third of the respondents were somewhat worried about the affects that proximity to a CPBS has on health (38%), stigma (34%), and future property value (25%) or aesthetics (25%). From the list of issues, respondents were most worried about future property value, but only 13.5% of the respondents responded this way. The responses are outlined in Table 2.

Table 2: Worries about Living Near a CPBS					
Extent to which res (Percentage of	-	about these possi ategory of concer			
Concern	Does not worry me	Worries me somewhat	Worries me a lot		
Possibility of harmful health effects	50	38	12		
Stigma effect	55	34	11		
Affect on future property values	61.5	25	13.5		
Aesthetics	63.5	25	11.5		

Reasons for the lack of concern may be due to the CPBS being either not visible or only barely visible from the homes of respondents or was far enough away from their property (as was indicated by many respondents, particularly in St Albans West, Upper Riccarton, and Bishopdale) and consequently it did not affect them much. The CPBSs were either far enough away or hidden by trees to not affect these respondents directly. The results may have been quite different had the CPBS being more visually prominent.

Survey 2: Control Groups

Of the 400 questionnaires mailed to homeowners and tenants in the control areas, 41% were completed and returned. The majority (94%, n=156) of the respondents were homeowners.

Desirability of the suburb as a place to live

Nearly two-thirds (65%, n=155) of respondents have lived in their suburb for more than five years and over a quarter (28%) have lived in their suburb between 1- 4 years. Over two-thirds (68%, n=152) rated their neighbourhood as either above average or superior as a place to live when compared with other similar suburbs. The reasons given for this are due to the close proximity to amenities including shops, library, medical facilities, public transport, and educational facilities; less traffic/quieter; more owner-occupiers; and better schools. Reasons given for the neighbourhood been rated as inferior to other similar neighbourhoods was due to it being further from the CBD (Avonhead); smell from the sewerage oxidation ponds and composting ponds (Bromley); lower socio-economic area and noise from the airport (Linwood).

Feelings towards a CPBS as an element of the neighbourhood

Nearly three-quarters (72%, n=154) of the respondents would be opposed to the construction of a CPBS nearby. The location of a CPBS would be taken into account by 83% (n=151) of respondents if they were to consider moving. As with the results from the case study survey, those control group respondents' that said the proximity of the tower was of concern to them, the most common reasons given for this were the effects of the CPBS on health, aesthetics and property values.

Affect on decision to purchase or rent

If a CPBS was located nearby, 45% (n=141) of the respondents would be prepared to pay substantially less for their property, over one-third (38%) would be prepared to pay just a little less for their property and 17% responded that it would not influence the price they would be prepared to pay. When asked what percentage affect that the CPBS had on the price/rent they were prepared to pay for their property, over a third (38%, n=125) felt it would decrease price/rent by more than 20% and a similar number (36%) said they would be prepared to pay between 10 to 19% less for their property. The responses are outlined in Table 3.

Table 3: Affect of the CPBS on Purchase/Rental Price Decision				
Price/Rent Effect (%)	% of Respondents			
20% more	3%			
10-19% more	2%			
1-9% more	2%			
1-9% less	19%			
10-19% less	36%			
20% or greater reduction in price/rent	38%			

This was an interesting result when compared to the case study areas. It seems that those living further away from the CPBSs are far more concerned about proximity to CPBSs than those that live near to them. The possible explanations for this are outlined below.

Concerns about the proximity to a CPBS

Of the concerns about CPBSs that respondents were asked to comment on, the negative effects on future property values and aesthetics were what respondents were most worried about. Nearly a half (47%, n=156 and 45%, n=154 respectively) of the respondents were worried a lot about these issues. Similar responses were recorded for the possibility of

harmful health effects in the future from CPBSs (42%, n=151 were worried a lot about this) and "stigma" associated with houses near CPBSs (43%, n=149 were worried a lot). The responses are outlined in Table 4.

Table 4: Wori	ies about Living	Near a CPBS		
Extent to which respondents worry about these possibilities (Percentage of respondents by category of concern)				
Concern	Does not worry me	Worries me somewhat	Worries me a lot	
Possibility of harmful health effects	20	38	42	
Stigma effect	21	45	34	
Affect on future property values	15	37	47	
Aesthetics	18	37	45	

In both the case study and control areas, the impact of proximity to CPBSs on future property values is the issue of greatest concern for respondents.

Other comments provided by respondents at the end of the survey were most informative. In summary, the main issues relating to CPBSs were that the potential health affects are not well known or understood enough; there are possible socioeconomic implications on both the siting of CPBSs and how they affect property values; some people do not mind, and accept the need for CPBSs, but do not want them built in their back yard, or they would prefer them to be disguised so they blend better with their environment. More importantly, there are concerns that the city council is not notifying the public about the possible construction of a CPBS.

Those comments relating specifically to property value affects and NIMBY syndrome are shown below:

Property Value Affects:

- We lived under high power transmission lines for 14 years and had a hard time selling the house: never again!
- I do not believe CPBSs have any affect on health: it is a perceived problem only but it does have an affect on property values.

- Initially the CPBS concerned me when first built because I felt it was an intrusion to the neighbourhood. This has diminished with time.
- In higher priced residential areas, prospective purchasers are more discerning than
 those buying in poorer quality residential areas and consequently the percentage
 diminution in value caused by closeness to a CPBS would be greater in Ilam then in a
 poorer quality residential area.

NIMBY syndrome:

- I am not opposed to CPBSs but would not want one in my back yard.
- People want new technology as long as it is not in their back yard.
- Having being involved with selling real estate in close proximity to cell phone towers, most folk do not want them next door to their property, nor across the road from them, but the Upper Riccarton tower seems to be well hidden by trees and consequently is not noticed. It seems that it is a case of "out of sight, out of mind".

Discussion of the results

The results indicate that people who live near CPBSs are far less concerned about the possible effects from living near CPBSs than those people who live further away from them. This was a surprising result. One explanation is that generally the residents cannot see, or barely notice, the CPBS from their homes and as such, they may be less concerned about it than if the CPBS were more noticeable. They may also consider it to be far enough away from their property to be of no influence, as the results from this study showed.

Alternatively, case study residents' apparent lower sensitivity to the CPBS than the control groups' residents may be due to the possible affect of cognitive dissonance reduction. In this case, they may be unwilling to admit, due to the large investment made in their home, that they have made a poor purchasing decision buying a property located close to a CPBS. Similarly, if the CPBS was built after they purchased their home they may be unwilling to admit that they have worries about the proximity of the CPBS as they may be concerned that admitting this will have a negative impact on their property's value. This is not the result that they would want if they were contemplating selling and moving due to the CPBS, or for any other reason.

Regardless of the reasons for the difference in responses from the case study and control groups, the overall results show that residents perceive CPBSs negatively. In both the case study and control areas, the impact of proximity to CPBSs on future property values was the issue of greatest concern for respondents. Overall, respondents felt that proximity to a CPBS would reduce value by between 10% to over 20%. The second part of the study that is the focus of a later article, involving an econometric analysis of Christchurch property sales transaction data, helps to confirm these results.

The comments added at the end of the survey indicate the ongoing concerns that residents have about CPBSs and issues that city councils need to address. In particular, the city council could help address concerns that residents have by providing more information about the potential health (and other) effects of CPBSs and notifying the public about any possible construction of a CPBS. Through public consultation, the council would likely gain greater acceptance of their siting decisions for the CPBSs. Additionally, the consultation process could lead to innovative approaches to the siting of CPBSs and the blending of these with their environment.

LIMITATIONS OF THE RESEARCH

The main limitation affecting this survey was in the selection of the case study areas. Specifically, the areas selected had CPBSs located in them that were not highly visible to residents. Had more visible CPBSs been selected, the results may have been quite different. Thus, caution must be used in making generalisations from the study or applying the results directly to other similar studies or valuation assignments. Factors that could affect results are the distance that homes are from the CPBS, the style and appearance of the CPBS, how visible it is to residents, and the socio-economic make-up of the resident population.

Further, it must be kept in mind that these results are the product of only one case study carried out in a specific area (Christchurch) at a specific time (2003). The value-effects from CPBSs may vary over time, as market participant's perceptions change due to increased public awareness regarding the potential adverse health and other affects of living near a CPBS. Perceptions toward CPBSs can change either positively or negatively over time. For example, as more information is discovered that refutes any adverse health effects from CPBSs and as this, together with information about the NZ Standards for high safety margins regarding the emission of RF and MW radiation, are made more publicly available, the perceptions of risk may gradually decrease. To confirm this, many similar studies need to be conducted over time and the results made public.

AREAS FOR FURTHER STUDY

This research has focused on residents' perceptions of living near CPBSs. Further research is needed to determine if the residents' reported willingness to pay for affected property, as indicated in this survey, are reflected in the price they actually pay for such property. To this end, a study that involves an econometric analysis of the sales transaction data has been completed and is the focus of a later article.

Given the public concerns about the potential risks arising from living near these structures, it is important for future studies to focus more attention on this issue. More information is needed on the kinds of health and other risks the public associates with CPBSs, and the level of risk perceived. How far away from the CPBS do people feel they

have to be to be safe? What CPBS design, size, and the kind of surrounding landscape would help CPBSs to be more publicly acceptable? What are the social, economic, educational and other demographic variables that influence how people perceive the risks from CPBSs? Are these perceived risks reflected in property values and to what extent? Do these perceived risks vary over time and to what degree?

Answers to these questions, if shared amongst researchers and made public, could lead to the development of a global database. Such a database could assist valuers in determining the perceived level of risk associated with CPBSs and other similar structures¹¹ from geographically and socio-economically diverse areas to aid in the valuation of property affected by these, anywhere in the world. Similarly, knowledge of the extent these risks are incorporated into property prices and how they vary over time will lead to more accurate value assessments of properties in close proximity to a CPBS and other similar structures.

SUMMARY AND CONCLUSIONS

This article presents the results of an opinion survey undertaken in 2003 of residents' perceptions towards living near CPBSs and how this impacts on property values. From the results, it appears that people who live close to a CPBS perceive the sites less negatively than those who live further away. However, the issue of greatest concern for respondents in both the case study and control areas was the impact of proximity to CPBSs on future property values. Overall, respondents would pay from 10-19% less to over 20% less for a property if it were in close proximity to a CPBS.

As research to date (ICNIRP) reports that there are no clearly established health effects from RF emissions of CPBSs operated at, or below, the current safety standards the only reason a rational investor might continue to avoid property near a cell site would be because it was intrusive on the views received from the property or because of the adverse aesthetic effects of the CPBS on the property. Yet, recent media reports (for example, Fox) indicate that people still perceive that CPBSs have harmful health effects.

Thus, whether or not CPBSs are ever proven conclusively to be free from health risks is only relevant to the extent that buyers of property near a CPBS perceive this to be true. Consequently, values of residential property located in close proximity to CPBSs may be adversely affected by the negative perceptions of buyers, regardless of research evidence to the contrary.

¹¹ For example, high-power overhead transmission lines

REFERENCES

Barnes, J. R. (1999), "Cellular phones: are they safe?" *Professional Safety*, Vol. 44 (12), pp. 20-23. Available from: http://proquest.umi.com [Accessed 21 May 2002].

Bond, S.G. & Hopkins, J. (2000), "The impact of transmission lines on residential property values: results of a case study in a suburb of Wellington, New Zealand", *Pacific Rim Property Research Journal*, Vol.6, No. 2, pp.52-60.

Borbely, A.A., Huber, R., Graf, T., Fuchs, B., Gallmann, E., Achermann, P. (1999), "Pulsed high-frequency electromagnetic field affects human sleep and sleep electroencephalogram", *Neurosci Let*, Vol. 275(3), pp. 207-210.

Burch, J.B., Reif, J.S., Yost, M.G., Keefe, T.J. and Pittrat, C.A. (1998), "Nocturnal excretion of urinary melatonin metabolite among utility workers", *Scand J Work Environ Health*, Vol. 24(3), pp. 183-189.

Cherry, N. (2000), "Health Effects Associated with Mobil Base Stations in Communities: The Need for Health Studies," Environmental Management and Design Division, Lincoln University, June 8. Available from: http://pages.britishlibrary.net/orange/cherryonbasestations.htm.

Christchurch City Council website. Available from: www.ccc.govt.nz/index.asp

Colwell, P. (1990), "Power lines and land value", *Journal of Real Estate Research*, Vol. 5(1), Spring.

Des Rosiers, F. (2002), "Power lines, visual encumbrance and house values: a microspatial approach to impact measurement", *Journal of Real Estate Research*, Vol.23(3), pp. 275 – 301.

Fox, S. (2002), "Cellphone antenna worries family", East & Bays Courier, Fiday November 8, p.1.

Hocking, B. (1998), "Preliminary report: symptoms associated with mobile phone use", *Occup Med* (Lond), Vol.48 (6), pp.357-360.

Kellenyi, L., Thuroczy, G., Faludy, B., and Lenard, L. (1999), "Effects of mobile GSM radiotelephone exposure on the auditory brainstem response (ABR)", *Neurobiology*, Vol. 7, pp.79-81.

Khudnitskii, S.S., Moshkarev, E.A., Fomenko, T.V. (1999), "On the evaluation of the influence of cellular phones on their users", [Article in Russian] *Med Tr Prom Ekol*, Vol. 9, pp. 20-24.

Krause, C.M., Sillanmaki, L., Koivisto, M., Haggqvist, A., Saarela, C., Revonsuo, A., Laine, M. and Hamalainen H., (2000), "Effects of electromagnetic field emitted by cellular phones on the EEG during a memory task", *Neuroreport*, Vol. 11(4),pp. 761-764.

Independent Expert Group on Mobile Phones: [Chairman, Sir William Stewart], (2000), *Mobile Phones and Health*. Report to the United Kingdom Government. [www.iegmp.org.uk].

International Commission on Non-Ironizing Raditation Protection (1996), "Health issues related to the use of hand held radio telephone and base transmitters", *Health Physics*, Vol. 70(9),pp. 587-593.

International Commission on Non-Ironizing Radiation Protection (1998), "Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz)", *Health Physics*, Vol. 74(4),pp. 494-522.

Kroll, C and Priestley, T. (1992), "The Effects of Overhead Transmission Lines on Property Values: A Review and Analysis of the Literature", Edison Electric Institute, July.

Mann, K. and Roschke, J. (1996), "Effects of pulsed high-frequency electromagnetic fields on human sleep", *Neuropsychobiology*, Vol. 33(1), pp.41-47.

Ministry for the Environment and Ministry of Health (2000), *National guidelines for managing the effects of radiofrequency transmitters*. [online] Available from: http://www.mfe.govt.nz and http://www.mfe.govt.nz and http://www.moh.govt.nz [Accessed 21 May 2002].

National Radiation Laboratory (2001), "Cellsites", March. Available from: http://www.nrl.moh.govt.nz

Royal Society of Canada (1999), "A review of the potential health risks of radiofrequency fields from wireless telecommunication devices". An expert report prepared at the request of the Royal Society of Canada for Health Canada, Ontario. [www.rsc.ca]

Szmigielski, S. and Sobiczewska, E. (2000), "Cellular phone systems and human health – problems with risk perception and communication", *Environmental Management and Health*, Vol. 11 (4), pp 352-368. Available from: http://haly.emeraldlibrary.com/vl=10902366/cl=13/nw=1/fm=html/rpsv/cw/mcb/0956616/3/v11n4/s5/p352 [Accessed 21 May 2002].

Telecom (2002), http://www.telecom.co.nz/content/0,3900,27116-1536,00.html [Accessed 19 December 2002].

Williams, R. (2001), "Phone zone – renting roofspace to Ma Bell", *The Property Business*. April, (12), 6-7.

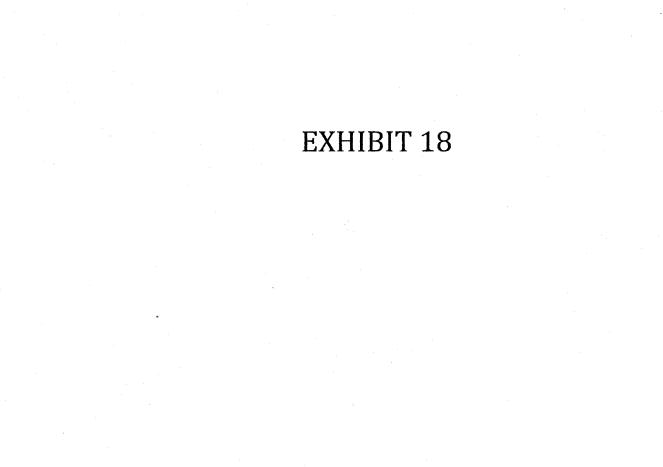
WHO (1993), Electromagnetic fields (300 Hz to 300 GHz), Environmental Health Criteria 137. World Health Organization, Geneva.

Wolverton, M.L. & Bottemiller, S.C. (2003), "Further analysis of transmission line impact on residential property values", *The Appraisal Journal*, Vol.71, No.3, pp. 244.

Vodafone (2002). http://www.vodafone.co.nz/aboutus/vdfn_about_cellsites.pdf [Accessed 19 December 2002] and http://www.vodafone.co.nz/aboutus/vdfn_about_health_and_safety.pdf [Accessed 19 December 2002].

Acknowledgements:

Mark Dunbar, Telfer Young and Robert Albrecht, DTZ for sharing the results of their cell phone research into valuation impacts from proximity to CPBSs. Maya Marshall, Project Administrator at Telecom NZ and Rapheal Hilbron, Community Relations Manager at Vodafone NZ for information about CPBS locations and environmental impacts from these.



HOMEOWNERSHIP CENTER

REFERENCE GUIDE

CONTENTS of HOC REFERENCE MANUAL

INTRODUCTION - An overview

Basic Eligibility Requirements

& Principal References

CHAPTER ONE - Appraisal and Property

Requirements Guide

CHAPTER TWO - Mortgage Credit Underwriting Guide

CHAPTER THREE - Miscellaneous Issues and Policies

CHAPTER FOUR - Attachments

TABLE OF CONTENTS

Click here to go to the <u>Index</u> to locate items alphabetically

	. Chapter - Page
1 <u>CHAPTER ONE</u> APPRAISAL AND	
PROPERTY REQUIREMENTS	1—1
PURPOSE AND SCOPE	1—2
PROPERTY ELIGIBILITY REFERENCES	
GROSS RENT MULTIPLIER	
APPRAISING REFINANCES	
FEES - APPRAISAL & INSPECTION	
EXPIRATION OF APPRAISALS	1—5
APPRAISER LICENSE RENEWAL & UPDATES	1—5
CONSTRUCTION & NEW HOMES	1—6
MANUFACTURED HOMES	
203(K) - REHABILITATION PROGRAM	
223(E) - DECLINING URBAN AREAS	
REVERSE MORTGAGE (HECM)	
NATIVE AMERICAN LANDS	
HAWAIIAN HOME LANDS	
PRIVATE ROADWAYS	
ZONING	
UNIQUE PROPERTIES	
HAZARDS & NUISANCES	
UTILITIES	
SEWAGE SYSTEMS	
WATER SYSTEMS	
REPAIR CONDITIONS	
PEST CONTROL	
ROOFS & ATTICS	
CRAWL SPACE & FOUNDATIONS	
HEATING & ELECTRICAL	
WATER HEATER	1—32
2 <u>CHAPTER TWO MORTGAGE</u>	
CREDIT GUIDEERROR! BOO	KMARK NOT DEFINED.
RELOCATION ERRO	n! Doorwang not beenieb
INCREASED FAMILY SIZE ERRO	
JOINTLY-OWNED PROPERTY ERRO	
NON-OCCUPYING CO-BORROWER ERRO	
SECONDARY FINANCING ERRO	
SOCIAL SECURITY CARDS FROM	

PURCHASING MARRIED, SOLE & SEPARATE	
CAIVRS	
RENTAL INCOME	. ERROR! BOOKMARK NOT DEFINED.
PREMIUM PRICING	ERROR! BOOKMARK NOT DEFINED.
ASSIGNMENT/TRANSFER OF CASES	. Error! Bookmark not defined.
VERIFICATION OF EMPLOYMENT	. ERROR! BOOKMARK NOT DEFINED.
GIFT FUNDS	. ERROR! BOOKMARK NOT DEFINED.
AUTOMATED UNDERWRITING SYSTEMS	. ERROR! BOOKMARK NOT DEFINED.
ADJUSTABLE RATE MORTGAGES	
MAXIMUM MORTGAGE LOAN CALCULATIONS	
REFINANCES	
DEBT TO INCOME RATIO	
RISK ANALYSIS	
CLOSING COSTS	. ERROR! BOOKMARK NOT DEFINED.
EARNED INCOME CREDITS	. ERROR! BOOKMARK NOT DEFINED.
CHILD SUPPORT	. Error! Bookmark not defined.
3 CHAPTER THREE	
MISCELLANEOUS POLICIESERROR	BOOKMARK NOT DEFINED.
MORTGAGEE APPROVALS	FRROR! BOOKMARK NOT DEFINED
EXTRA TERRITORIAL APPROVAL	
AUTHORIZED AGENT	
PRE-CLOSING	
DOWN PAYMENT ASSISTANCE PROGRAMS (DAP)	
HOMEBUYER EDUCATION	
FHA CONNECTION	
HUD/FHA ON THE INTERNET	
VERIFICATIONS & DOCUMENTATION	
4 CHAPTER FOUR	
ATTACHMENTSERROR!	DOOUMADE NOT DEFINED
LEGAL CERTIFICATION FORM	. ERROR! BOOKMARK NOT DEFINED.
PRE-CLOSING CASE BINDER COVER SHEET	
MCRV CONVERSION CHECKLIST	
CHECKLIST FOR PROPOSED, UNDER CONSTRUCTION AN	D NEW PROPERTIES ERROR! BO
LOCAL AUTHORITY CONSTRUCTION INSPECTIONS ACCI	EPTANCED BY HITDEPPOP! ROO

1 CHAPTER ONE APPRAISAL AND PROPERTY REQUIREMENTS

HOC REFERENCE MANUAL

Clicking on underlined words in this manual will take you to other links.

Copy Printed: 9/15/2014

REVISION I Revision Effective: 05-30-00

PURPOSE AND SCOPE

PURPOSE OF THE FEDERAL HOUSING ADMINISTRATION (FHA) APPRAISAL AND PROPERTY CONDITION ASSESSMENT

The appraisal and property condition assessment is used to determine the market value and acceptability of the property for FHA mortgage insurance purposes. The value serves as a basis for determining the maximum FHA insurable mortgage loan. The appraisal is performed for the use and benefit of HUD, and the lender involved in an FHA transaction. In addition to providing an estimate of value, the appraisal provides an examination of the property for any visible, obvious and/or apparent deficiencies that may affect the livability of that property in terms of basic needs, health and safety of the property's occupants. HUD/FHA MAKES NO WARRANTIES AS TO THE VALUE AND/OR CONDITION OF ANY FHA-APPRAISED PROPERTY, therefore buyers/borrowers must determine for themselves that the price of the property is "reasonable" and that it's condition is "acceptable". NOTE: Borrowers should be encouraged to obtain a detailed HOME INSPECTION of the property. Up to \$300 of this fee is considered an allowable fee as per Secretary Cuomo's Homebuyer Protection Plan dated 6/1/98.

REVISION I Revision Effective: 05-30-00

PROPERTY ELIGIBILITY REFERENCES

Basic Eligibility Requirements - The primary references for single family properties, one to four units are:

- 1. HUD Handbooks
- 2. **Code of Federal Regulations**, Title 24, (24CFR) Codifies the general and permanent rules of the Department.
- 3. **Mortgagee Letters** Typically reflect interpretation, clarification, changes and additions to policies produced since the last printing of a HUD Handbook.
- 4. **To order or view** handbooks, forms, Mortgagee Letters, etc. on line refer to the section of this manual titled "HUD/FHA On The Internet"
- 5. **To locate** HUD/FHA Offices and online services see the section of this manual titled "HUD/FHA On The Internet"

GROSS RENT MULTIPLIER

Gross Rent Multiplier (GRM) - When using the URAR for three and four unit properties the appraiser is to complete the Gross Rent Multiplier calculations and analysis. If the FNMA 1025 - Small Residential Income Property Appraisal Report form is used then completion of they GRM section on the form is acceptable. Click for access to the recommended <u>GRM Form</u> and <u>GRM Sample</u>. See HUD Handbook 4150.2, "Income Approach".

APPRAISING REFINANCES

To access information quickly click on one of the following:

- A. Refinance
- B. Streamline Refinance

Appraising Refinances - Definitions of both Refinances and Streamline Refinances can be found in HUD Handbook 4155.1 REV-4 CHG 1, Chapter 1, Section 4.

A. Refinance - A standard requires a complete appraisal with repair conditions, while a streamline refinance may be insured with or without an appraisal. The Valuation Condition (VC) form and the Homebuyer Summary apply to refinances from conventional financing and on cash-out FHA to FHA refinances. Lenders must ensure that the appraiser is fully informed on the type of appraisal that is being ordered. Appraisers may routinely wish to complete both the VC form and the Homebuyer Summary.

Copy Printed: 9/15/2014

REVISION I

1---3

Revision Effective: 05-30-00

B. Streamline Refinance - Streamline refinances are designed to lower the monthly principal and interest payments on a **CURRENT FHA-insured** mortgage and must involve no cash back to the borrower except for minor adjustments at closing not to exceed \$250. Streamline refinances can be insured with or without an appraisal. Streamline refinances with an appraisal, the (VC) form is required, the Homebuyer Summary is not required. FHA does not require repairs (except for lead based paint repairs) on streamline refinances with appraisals, however the lender may require completion of repairs as a condition of the appraisal.

Additionally, FHA does not require an appraisal on streamline refinances, however, if the lender is required by law or banking regulations (e.g., FIRREA) or its investors to obtain an appraisal on a mortgage that will be processed as if no appraisal was made, the appraisal fee may be paid by the borrower out-of-pocket (i.e., not financed).

Reference: Handbook 4155.1, Rev. 4 Chpt. 1, and Mortgagee Letter 96-10

FEES - APPRAISAL & INSPECTION

To access information quickly click on one of the following:

- A. Appraisal fees
- B. Inspection Fees
- C. Appraisal Forms
- A. Appraisal fees (Reference: HUD Handbook 4150.2 Section (1-2))
 - 1. HUD no longer establishes fees or due dates. Mortgagee Letter 97-22.
- **2.** The appraiser and lender will **negotiate the price and due date**, consistent with USPAP guidelines. This includes fees for canceled assignments, missed appointments, etc. Collection of unpaid fees are the responsibility of the appraiser.
 - **3.** Fee is paid for market value estimates based on HUD policy and procedure. Fees are never contingent upon the appraiser arriving at a minimum or specific valuation, an amount or within a predetermined range of values or loan approval.
 - **4.** Appraisal Management Firms may charge the mortgagor a fee for the appraisal that may encompass fees for services performed by the firm as well as fees for the appraisal itself. However, the total of these fees is limited to the customary and reasonable fee for an appraisal in the market area where the appraisal is performed. All aspects of RESPA must be complied with. (While the owners/operators of such Appraisal Management firms may be licensed, the appraiser actually doing the appraisal must be licensed and on HUD's Approved Roster. No "supervisory" appraisals. That is, the licensed/approved appraiser must visit the subject and all comparables and complete the appraisal analysis. Others may accompany this appraiser to assist with measuring and photo taking, but the Roster Appraiser must actually do the appraisal and sign it.) Appraisal trainees shall not sign on the appraisal report in any capacity.

B. Inspection Fees

Copy Printed: 9/15/2014

REVISION I

-4 Revision Effective: 05-30-00

Inspection and Mileage Fee <u>Click here for individual HOC maximum inspection fees</u>. This is for both new construction and repair inspections. Inspection and mileage may differ within individual HOC jurisdictions.

203(k) Inspections. The fees for 203(k)s are outlined in HUD Handbook 4240.4 Rev-2 and Mortgagee Letter 95-40.

C. Appraisal Forms Appraisal written on the Uniform Residential Appraisal Report form (URAR), the Federal National Mortgage Association's (FNMA) Individual Condominium Unit Appraisal Report form, or FNMA's Small Residential Income Property Appraisal Report form are acceptable to the Department. Currently, only these forms are acceptable for FHA cases. Other FNMA appraisal forms which are used for streamlined appraisal or a qualitative sales comparison analysis are not acceptable at this time. *Mortgagee Letter 97-22.*

EXPIRATION OF APPRAISALS

FHA appraisals on existing properties over one (1) year old are valid for six (6) months with **no** extension period.

Proposed construction, under construction, and existing properties (less than one (1) year old) is valid for twelve (12) months. A 12 month extension may be granted for lots on which construction began prior to the previous expiration.

Appraisals on Section 203(k) loans are valid for a period of twelve (12) months.

Master Appraisal Reports (MARS) are valid for 12 months. These may be extended up to 12 (twelve) additional months for lots on which construction has started. Requests for extensions must be received by the underwriter prior to the commitment expiration date. There is no grace period allowed for this type of extension. The appraisal and value of alternates must be updated prior to the extension being granted.

The date of the appraisal is the date the property was inspected by the appraiser. Validity period runs from that date.

For information on the extension of the Firm Commitment visit HUD Handbook 4000.2.

APPRAISER LICENSE RENEWAL & UPDATES

To be eligible for placement on the FHA Roster of Appraisers, and thus be eligible for selection by a lender to appraise a property that will be security for FHA insured mortgage financing, an appraiser must:

- be State licensed or certified in accordance with the minimum licensing criteria

Copy Printed: 9/15/2014

REVISION I

1--5

established by the Appraiser Qualifications Board of the Appraisal Foundation,

- not be listed on either the General Services Administration's Suspension and Debarment List, HUD's Limited Denial of Participation (LDP) List, or HUD's Credit Alert Interactive Voice Response System (CAIVRS), and
- pass a HUD/FHA examination on appraisal methods and reporting.

An appraiser's status is automatically changed to inactive in CHUMS upon the expiration of the appraiser's license. The appraiser is responsible for notifying HUD's Real Estate Assessment Center (REAC) of any changes in their personal data. It is also highly recommended that appraisers submit their renewed license prior to their license's expiration date. Refer to Mortgagee Letter 99-35, dated November 24, 1999, for detailed instructions on procedure to obtain placement on the FHA Appraiser Roster and appraiser license renewal and updates.

If an appraisal assignment is made without a case number and verification that the appraiser is currently on the Roster, the lender takes the risk of not being able to obtain a case number and/or insurance if an appraiser cannot be approved or re-instated. Lenders are cautioned that appraisers can be removed at any time from the roster for disciplinary actions.

CONSTRUCTION & NEW HOMES

To access information quickly click on one of the following:

- A. Introduction
- B. Construction Definitions
- C. General Requirements
- D. Minimum Property Standards
- E. Subdivision Approvals
- F. Final Inspection on Properties
- G. Existing Homes

A. Introduction

- 1. It is the appraiser's responsibility to determine the exact category of "CONSTRUCTION" he/she is appraising. This is reported on page 1 of the URAR in Description of Improvements.
- **2.** The "category" in which the appraiser reports the construction status is important for several reasons:
 - a. Determines the high or low-ratio status of the mortgage to be insured by FHA.
 - b. Determines the specific Conditional Commitment Requirements.
 - **c.** Provides the Direct Endorsement Underwriter the proper information needed to determine exactly how to process the case.
- **3.** The condition of the site on the date the appraiser makes his/her on-site appraisal inspection (i.e. date of valuation) determines the project's construction status.
- **B.** Construction Definitions: Click here for a complete list of items required for high/low ratio loans found in HUD Handbook 4145.1 Appendix 11.

Copy Printed: 9/15/2014

REVISION I

1---6

- 1. Proposed Construction are properties approved for mortgage insurance prior to the beginning of construction. This means that the DE Statement of Appraised Value or Early Start letter has been issued by the DE Underwriter for the property prior to pouring of the footing. For high ratio loans, provide either the appraisal or Early Start letter AND at least three inspections (initial, framing and final) by a HUD fee approved panel inspector or approved local jurisdiction. When the inspections are performed by a HUD approved fee panel inspector the form HUD 92051 Compliance Inspection Report must be completed and submitted in the case binder. If the above items are not provided, evidence of an approved ten year warranty and a final inspection are required for high ratio loans.
- 2. Under Construction are properties that are under construction and are not complete at the time of the appraisal. For high ratio loans, provide final inspection by a HUD approved inspector or approved local jurisdiction AND evidence of an approved ten year warranty. (NOTE: For properties under construction, three local inspections do not allow for maximum financing unless combined with an approved ten year warranty.) Under Construction status is in effect with the first placement of concrete through the point of being 100% complete.
- **3.** Existing Construction (less than one year old) (new, prior occupancy has no bearing) properties that are less than one year old. If no repair or correction conditions are made by the appraiser, the appraisal serves as the final inspection as per HUD Handbook 4145.1 paragraph 6-3-A(3). A ten year warranty is required in the case binder for maximum financing.

C. General Requirements:

- 1. Appraisals/Appraisers
 - Lender to provide appraiser The lender must provide the appraiser with the following documents. If not provided return the incomplete appraisal to the lender:
 - 1) Builder's plans, specifications and construction documents:
 - Plot Plan (including dwelling and accessory buildings, finish grade elevations and direction of drainage)
 - Floor plan (separate foundation plan and plan of each floor and basement, if any)
 - Kitchen cabinet details
 - Electrical layout
 - Heat layout (ductwork and location of all vents)
 - Heat loss calculations
 - Cooling system layout
 - Exterior elevations (front, side and rear)
 - Sections (exterior wall sections, stairwells, and stairs)
 - Fireplace section and elevations
 - Roof truss details
 - Water supply plans and specifications
 - Sewage system plans and specifications
 - Individual water supply and sewage disposal systems, if applicable
 - Description of materials HUD Form 92005

- 2) Completed Builder's Certification (Form HUD-92541) signed and dated no more than 30 days prior to the date the appraisal was ordered.
- 3) All reports and available information (i.e. sales agreement, title report, environmental reports or studies and inspection reports)

NOTE: Appraisers must receive a fully executed form HUD-92541, Builder's Certification of Plans, Specifications, & Site, before performing the appraisal on proposed, under construction or less than one year old properties. Appraisers must review Item 1 on the form and note in the Appraisal Report any discrepancies between the information in Item 1 and the actual conditions observed on site. The lender is responsible to address any yes answer in Item 1.

- 2. Lender required documents for proposed, under construction and existing less than one year old properties. Click here for link to 4145.1 Appendix 11.
 - a. Complete appraisal package or Master Appraisal Report (MAR)
 - b. Form HUD-92544, One Year Builder's Warranty
 - c. Form HUD-92541, Builder's Certification
 - **d.** A complete set of architectural drawings, plans and specification as noted above. (These are to be kept in the lender's files and will not be submitted with the case binder when requesting endorsement.)
 - **e.** Termite forms of the National Pest Control Association, NPCA 99a and NPCA 99b (where applicable) (Mortgagee Letter 99-3.)
 - f. Early start letter or ten year warranty as applicable.
 - g. Applicable inspections and/or certifications
 - h. Any other additional/appropriate submissions required in satisfying FHA requirements which may include, but are not limited to the FHA Data Sheet 79G; a LOMA/LOMR or elevation certificate (Refer to *Mortgagee Letter 99-34*, dated November 16, 1999) regarding flood plains, well water tests, local health authority approval for individual water and sewer systems, etc.

Note: Unless otherwise indicated, above listed items are to be included in the endorsement case binder. Also, Mortgagee letter 99-34 <u>IS NOT</u> applicable for condominium projects in any capacity.

D. Minimum Property Standards - MPS

Appraisers and others dealing with FHA loans should be familiar with HUD Handbook 4910.1 Appendix K, Minimum Property Standards for Housing, which contains a summary of the basic requirements for newly constructed single family homes insured by FHA.

E. Subdivision Approvals

HUD/FHA no longer approve subdivisions. Paragraph 3-11 of the HUD Valuation <u>Handbook 4150.1, Rev-1</u>, has been **modified by** <u>Mortgagee Letter 93-27</u>. This is not applicable to Planned Unit Developments and Condominiums. The "Builder Certification" and the "Improved Area" concept are the current procedures to be followed for subdivision processing.

- **F.** Final Inspection on Properties "under construction" or "existing less than one year old". Click here for 4145.1 Chapter 6-3
 - 1. If the home **is 100% complete** at time of the appraisal and the appraisal is to serve as the final:

Copy Printed: 9/15/2014

REVISION I

1---8

- **a.** The appraiser must have a complete set of the plans, specifications (as described in Section C) including the Builders Certification HUD-92541in order to do the appraisal.
- **b.** The appraisal serves as the final inspection and Form HUD-92051 is not required.
- 1. The appraiser is to verify general conformance with plans and specifications;
- 2. Inspect for health and safety violations;
- 3. If no health and safety problems are noted and the property is ready for occupancy, the appraiser is to make the following statement in the remarks section of the appraisal: "This is a newly completed dwelling and appears to be in conformance with the submitted construction exhibits."
- 4. Take a clear photograph (in addition to the standard appraisal photos) of each diagonally opposite front and rear corner of the house to record adequate grading and drainage of the site; and
- 5. Make a statement on the appraisal report of the acceptance of the grading and drainage.
- 2. If the property is under construction and NOT 100% complete at time of appraisal:
 - **a.** The appraiser must have a complete set of the plans and specifications and the Builder Certification in order to do the appraisal (as described in Section C).
 - **b.** The appraiser will perform the appraisal and call for a final inspection to be completed by a FHA Fee Inspector; or, when applicable, the local authority or equivalent. The appraiser will make the following statement on the appraisal report: "Property under construction; complete according to submitted construction exhibits."
 - **c.** When the final inspection is completed by a fee inspector, the inspection will include photographs as noted in Item 1 above along with a statement on the HUD-92051 as follows: "This is a newly completed dwelling that was not completed under HUD or VA inspections. The dwelling appears to be in conformance with the submitted construction exhibits." Refer to HUD Handbook 4145.1 Section 6-3.
- **3.** The Department requires that <u>all utilities are on and fully functional</u> during a final inspection otherwise, the property is not 100% complete.

NOTE: "Local Authority Construction Inspections". Click here for individual HOC jurisdictions.

Webmaster: this will be a link to each HOC homepage.

MANUFACTURED HOMES

To access information quickly click on one of the following:

- A. Eligibility & General Requirements Title II
- B. Special State Requirements
- C. Age Requirement

Copy Printed: 9/15/2014

REVISION I

- D. Foundation Compliance
- E. Site
- F. Tags
- G. Title I
- Eligibility & General Requirements Title II

A Manufactured Home is a structure that is transportable in one or more sections. In traveling mode, the home is eight feet or more in width and forty feet or more in length. A Manufactured Home is designed and constructed to the Federal Manufactured Construction and Safety Standards and is so labeled. To be eligible for FHA mortgage insurance, all manufactured home must comply with the following:

- have a floor area of not less than 400 square feet;
- be constructed after June 15, 1976, in conformance with the Federal manufactured home construction and safety standards, as evidenced by an affixed certification label in accordance with 24 CFR Section 3280.8; (manufactured homes produced prior to that date are ineligible for insured financing);
- be classified and subject to taxation as real estate;
- the mortgage must cover both the manufactured unit and its site and shall have a term of not more than 30 years from the date amortization begins;
- · built and remains on a permanent chassis;
- designed to be used as a dwelling with a permanent foundation built to FHA criteria;
 and
- the finished grade elevation beneath the manufactured home or, if a basement is used, the lowest finished exterior grade adjacent to the perimeter enclosure, shall be at or above the 100-year return frequency flood elevation.

Modular construction is also a factory-built home, but is treated the same as stick-built housing.

For information on FHA Insurance under the Title II Program, see HUD Handbooks 4150.2 Chapter 8; HUD Handbook 4145.1, REV-2, Section 3-4 and Appendix 11; and Permanent Foundations Guide for Manufactured Housing (HUD-7584), dated September 1996 (Mortgagee Letter 97-36). The latter is a revision of HUD Handbook 4930.3, dated August 1989. The guide and software may be obtained by calling 1-800-245-2691 or on the Internet at http://www.huduser.org, then select publications, then Manufactured Housing, then the guide or software.

- **B.** Special State Requirements. Some states require a state agency to approve all modifications to manufactured (mobile) homes once they leave the factory. The appraiser and underwriter are held responsible for knowing the local regulations on this. If the area where the manufactured home is located has such requirements, then the property must meet these requirements or it shall be deemed ineligible for FHA insurance.
- **C.** Age Requirement A manufactured home must be built after June 15, 1976, and bear an affixed "HUD seal" on each section to be eligible for FHA Insurance. The appraiser should verify the location and wording on the seal(s). Manufactured houses built before June 15, 1976, must be rejected. No exceptions are allowed.

D. Foundation Compliance

- All foundation systems, new and existing, must meet the guidelines published in the Permanent Foundations Guide for Manufactured Housing, HUD-7584, dated September 1996. A certification attesting to compliance with this handbook must be obtained from a licensed professional engineer and included in the insuring file. This procedure does not apply when the current FHA borrower refinances their loan. It is applicable for all re-sales.
- HUD Handbook 4145.1 Section 3-4. C. Criteria for Existing Properties, dated Feb.
 1990 states: "The foundation design information in HUD Handbook 4930.3,
 Permanent Foundations Guide for Manufactured Housing, Appendices A,B and C,
 may be used to verify the design of the existing system. Provide a licensed
 professional engineer's certification to verify compliance with the handbook
 guidelines and with the requirements set forth in paragraph 3-4.B." Handbook
 4930.3 was republished as HUD-7584.
- 3. <u>Permanent Foundations Guide for Manufactured Housing</u>, HUD-7584 (PFGMH) This guide as well as software can be ordered by calling 1-800-245-2691 or from the web at www.huduser.org.
- **E. Site -** The manufactured unit must not have been installed or occupied previously at any other site or location. Manufactured units may be moved only from the manufacturer's or dealer's lot to the site on which the unit will be insured. If a permanent foundation is to be constructed under an existing eligible unit, the unit may be jacked up in order to install a new foundation. (See summary of main requirements in Appendix 11, item 12 of HUD Handbook 4145.1 Rev-2.)
- **F. Tags -** All manufactured homes must have an affixed HUD seal(s) located on the outside of the home. If the home is a multi-wide unit, each unit must have a seal. This will be numbered sequentially. Appraiser is to list the manufactured unit's tag number(s) on the appraisal report in one of the comment sections, preferably on the front page under "Additional Features".

If for any reason the tags are missing, appraisers must REJECT the property and notify the lender. In some states a manufactured home may not be re-sold if missing a seal. If this is the case, the property is a reject. However, a lender may contact the NCSCS (Housing Building Technology Division) and request issuance of a letter stating that the home was in fact HUD labeled. Contact NCSCS (Pam Brillhart) 703-437-0100. (The information on the data plate inside the home is not an acceptable alternative.). The lender/home owner need to obtain the serial number(s) of the home from the data plate found inside the home, or the serial numbers found on the steel chassis under the home. With these numbers the HUD and the NCSCS can research to see if in fact the home was properly labeled.

G. Title I - Title I consists of two loan programs, one for property improvements and one for the purchase of manufactured homes and/or lots on which the manufactured homes are to be placed. Repossessions under this program are done by the lender under the Uniform Commercial Code or through judicial processes. For more information on the Title I program, visit their web site at http://www.hud.gov/progdesc/manuf14.html. or call the Title I customer service number 202-708-6396. (Regulations can be found in 24CFR 201.)
Sections 8-3 and 8-4 of HUD Handbook 4250.2 pertain to Title I.

Copy Printed: 9/15/2014

REVISION I

1--11

203(k) - REHABILITATION PROGRAM

To access information quickly click on one of the following:

- A. General
- B. Appraisal
- C. Consultant
- **A.** General The Section 203(k) program is the Department's primary program for the rehabilitation and repair of single family properties. The program allows the borrower to get just one mortgage loan, at a long-term fixed or adjustable rate, to finance or refinance both the acquisition and the rehabilitation. See HUD Handbook 4240.4 Rev-2 and 4150.2 Appendix B-1. (Cooperatives are not eligible for 203(k).)

B. Appraisals

- **1.** The appraiser is not to include VC Conditions on the appraisal report for a 203(k). However, if the appraiser identifies repair conditions that were not noted in the work write-up, the appraiser should notify the lender.
- 2. An appraiser may not perform a dual role on the same 203(k) property. To prevent apparent conflict of interest an appraiser may not be a 203(k)consultant, or have a direct or indirect involvement on any property he/she appraise.
- 3. The appraisal will contain a statement on the report by the final value that the appraisal being performed is a 203(k) as improved per plans & specifications. A copy of the plans, specifications, work write-up and other conditions upon which the value was based must be part of the appraisal package.
 - **4.** In mixed use properties, commercial space is to be appraised as if it were residential. The lot value assigned should be for the residential use, not the commercial use.

A. Consultant

1. List of Approved 203(k) Consultants and additional related information for each HOC can be accessed by clicking here or visiting http://www.hud.gov/fha/sfh/keywords.html

Additional information on matters relating to consultants may be obtained from HUD Mortgagee Letters <u>95-40</u> and <u>00-25</u>. Please note that HUD Mortgagee Letters and Handbooks may be researched on the Internet at http://www.hudclips.org/sub_nonhud/cgi/hudclips.cgi

Copy Printed: 9/15/2014

REVISION I

1-12

223(e) - DECLINING URBAN AREAS

PURPOSE AND GENERAL INFORMATION - <u>HUD Handbook 4260.1</u> Miscellaneous Type Home Mortgage Insurance Section 223(a), (e), and (d), (<u>HUD Handbook 4150.2</u>)

The purpose of Section 223(e) is to permit the use of FHA mortgage insurance in older, declining urban areas where there is a need for affordable housing. For additional information on appraising and underwriting a 223(e) mortgage, see the references above.

ADP CODE for a 223(e) is 792.

REVERSE MORTGAGE (HECM)

To access information quickly click on one of the following:

- A. General
- B. Appraisal & Conditions
- **A. General** Section 255: Home Equity Conversion Mortgages (Reverse Mortgages, a.k.a. HECM) allows a borrower aged 62 and older to borrow against the equity in a property that has limited outstanding debt. A subject property under this program must be an existing one-to four-unit dwelling in which the mortgagor occupies one of the units. It may be a condo or PUD if in a FHA approved project. Manufactured homes are eligible if the home complies with outstanding FHA guidance.
- **B.** Appraisal & Conditions -The appraiser must perform the appraisal with the same standards and forms expected in an FHA single-family appraisal.

The same deficiencies and repair items must be noted on the appraisal forms. In certain instance, the borrower is not required to treat any defective paint surfaces after closing for properties built before 1978.

<u>See HUD Handbook 4235.1, Rev-1, Section 3</u> for requirements of appraisal and property.

NATIVE AMERICAN LANDS

To access information quickly, click on one of the following:

4150.2 Appendix A-2

National Office of Native American Programs

Copy Printed: 9/15/2014

REVISION I Revision Effective: 05-30-00

HAWAIIAN HOME LANDS

To access information quickly click on one of the following:

- A. General Eligibility
- B. Appraisals on DHHL
- C. ADP Code
- A. General Eligibility A mortgage on a homestead lease granted by the Department of Hawaiian Home Lands covering a one- to four-family residence located on Hawaiian home lands is eligible for insurance pursuant to section 247 of the National Housing Act (12 U.S.C. 1715z-12) if the mortgagor is a native Hawaiian who will occupy it as a principal residence. Mortgage insurance on cooperative shares under Sec. 203.43c on homes in federally impacted areas under Sec. 203.43e is not authorized under this section." See 24CFR Sec. 203.43i for more information.
- **B.** Appraisals on DHHL Appraisals on Department of Hawaiian Home Lands (DHHL) properties (existing and proposed construction) only require the use of the Cost Approach. This change was brought about because appraisers felt that performing the Sales Approach on DHHL violated the Uniform Standards of Professional Appraisal Practices (USPAP). Licensed appraisers are required to conform to USPAP which identifies Market Value as "...the most reasonable price which a property should bring in a competitive and open market:". The Market Approach or Sales Comparison Approach is no longer required as these properties are neither freely transferable nor subject to an open market.

In the Reconciliation Section of the URAR under Conditions of the Appraisal, the appraiser can conclude that the appraisal is being completed per HUD instructions for FHA mortgage insurance purposes only and the sales comparison approach is waived for DHHL properties.

A statement can be added in the Reconciliation Section of the URAR when estimating the final value that, "the value stated in the appraisal is not "market value" as defined in USPAP", however, the appraiser must include a date (which is the date of the inspection), a value and sign the appraisal.

References: 24CFR Sec. 203.43i Eligibility of mortgages on Hawaiian Home Lands insured pursuant to section 247 of the National Housing Act.

C. Hawaiian Home Lands The ADP code for a regular DHHL loan should be **759**, **if** it is a DHHL buydown, then the ADP code should be **811**.

PRIVATE ROADWAYS

To access information quickly, click on one of the following:

- A. General
- B. Underwriters' Note

Copy Printed: 9/15/2014

REVISION I

1—14

C. Criteria for Agreement Acceptance

A. General - (Reference:: 24 CFR Sec. 200.926d)

1. Each property shall be provided with vehicular and pedestrian access by a public or private street. Private streets shall be protected by permanent easements. Existing or proposed streets at the site shall connect to private or public streets and shall provide all-weather access to all buildings for essential and emergency use, including access needed for deliveries, service, maintenance and fire equipment.

FHA defines all-weather surface as a road surface over which emergency and the area's typical passenger vehicles can pass at all times.

- 2. Private streets must be protected by permanent recorded easements and have joint maintenance agreements.
- **B.** Underwriters' Note The recorded easement and road maintenance agreement must be reviewed and approved by the Direct Endorsement Underwriter and documented in the file when the loan is submitted for mortgage insurance. A letter to the file from the DE Underwriter is the only item to be included in HUD's insuring file.

C. Criteria for Agreement Acceptance:

- 1. The agreement includes the entire private road system to the public road;
- 2. The agreement and access must be legal and in perpetuity (i.e. run with the land);
- **3.** The road is in an acceptable condition. The roadway(s) within the system must have all-weather surface(s). An all-weather surface is defined above.
- **4.** The agreement states how the costs are to be shared (e.g. equally by all lots, pro-rata). The provision for maintenance must not create an unusual or abnormal burden upon the ownership of the subject property.
- **5.** All of the property owners served by the private road system must be party to the agreement.
- 6. The roadway meets local jurisdictions emergency service access requirements.
- 7. The above requirements may be waived by the Direct Endorsement Underwriter when the subject property abuts a publicly maintained road and the easement is a common driveway between two neighbors, and it is all weather, such as in a shared driveway in many older parts of cities.

ZONING

To be eligible for FHA Insurance a property is to be "legal" and free of health and safety hazards and major structural problems. If the use is not legal, the property is not eligible for HUD mortgage insurance and remains such until it becomes legal. A property can be "legal" "non-conforming". In this case the non-conformance part is to be reflected in value, if applicable.

UNIQUE PROPERTIES

Copy Printed: 9/15/2014

REVISION I

1---15

To access information quickly, click on one of the following:

- A. Unique Properties
- B. Shared Lots with Undivided Interests
- C. Excess Land
- D. Nonresidential Use
- E. Move Ons
- F. Forest & Farm Property Tax Deferral Programs
- **A.** Unique Properties Sometimes a unique property, such as a log home, extra small home, lower than normal ceiling heights, etc., is submitted for FHA insuring. The eligibility of these properties depends on whether or not the property is structurally sound and readily marketable. If a property meets these criteria, the appraiser establishes market value. However, depending on the uniqueness of a property, the final determination to accept or reject the house is made by the lending institution's underwriter.
- **B.** Shared Lots with Undivided Interests Properties, including condominiums, with legal descriptions that read "An undivided ½ (or 1/3,) interest in and to Lot." are NOT eligible for mortgage insurance. If requested to do an appraisal on a property with this kind of legal description, the appraiser should **REJECT** the property as the lot is not considered a Fee Simple entity. The lender should be notified of the Reject as soon as it is determined.
- **C. Excess Land -** Excess land is defined as that which is larger than what is typical in the neighborhood AND capable of a separate use. Generally, the excess portion can be subdivided and marketed as an individual parcel. However, in small communities and outlying areas, appraisers must use different criteria because the market may accept a wide variance in lot sizes. If the plot contains excess land, the appraiser should describe it but not value it. In this instance, the appraisal is based upon a hypothetical condition. A legal description of the portion being appraised is required. The lender will require that the excess land be excluded from the mortgage security.
- **D.** Nonresidential Use Any nonresidential use of the property shall be subordinate to its residential use and character. A property, any portion of which is designed or used for nonresidential purposes, is eligible only if the type and extent of the nonresidential use does not impair the residential character of the property.

Areas designed or used for nonresidential purposes shall not exceed 25 percent of the total floor area. Storage areas or similar spaces which are integral parts of the nonresidential portion shall be included in the total nonresidential area. <u>HUD Handbook 4905.1 Rev-1, Section 2-6.</u>
On 203(k) mortgages, the percentage floor area used for commercial purposes follows these standards:

- One story building 25 percent
- Two story building 49 percent
- Three story building 33 percent
- E. Move-Ons See HUD Handbook 4150.1 REV-1, Section 12-6 for instructions.
 - 1. This procedure applies only to stick built homes. Manufactured homes (mobile homes) are not eligible for FHA Insurance if they have moved. The only

Copy Printed: 9/15/2014

REVISION I

movement acceptable for manufactured homes is from the factory to the dealer and then to the site. Once there it must remain. It may be jacked up to have a permanent foundation installed. See the section on Manufactured Housing.)

2. Homes moved without prior approval.

A house which has been moved to a new foundation without prior HUD approval is to be treated in the same manner as proposed construction. That is, if it has been on the new foundation for less than one year, it would be eligible for only a low ratio loan; if it has been on the new foundation for more than a year, it should be treated as any other existing construction over a year old and be eligible for a high ratio loan. If a house, covered by HUD insurance, is moved without prior approval, whether emergency or non-emergency, the move is made at the risk of the mortgagee. Any damage which may occur to the house during the move will be the responsibility of the mortgagee.

The 203(k) program is available to assist an applicant to move a house.

F. Forest & Farm Property Tax Deferral Programs - The programs provide a deferral of a portion of the property taxes when the land qualifies under these uses. The "deferred" portion of the taxes are eventually totally forgiven if that land use continues for a specified period of time.

Farm or forest deferral of taxes does not make a property ineligible for mortgage insurance. **If** it is likely that the farm or forest use will not continue, a termination of deferral and payment of all deferred taxes must be required.

HAZARDS & NUISANCES

To access information quickly, click on one of the following:

- A. Airports
- B. Railroad Tracks and Other High Noise Sources
- C. Flood Zones & Insurance
- D. Lead-Based Paint
- E. Radon
- F. Overhead High Voltage Transmission Towers & Lines
- G. Operating & Abandoned Oil & Gas Wells, Tanks, Pressure Lines
- H. Insulation Materials
- I. Lava Flow Zones
- J. Avalanche Hazards

The property must be free of all foreseeable hazards and adverse conditions that: (1) may affect the health and safety of the occupants (2) may affect the structural soundness of the improvements (3) may impair the customary use and enjoyment of the property. The hazards include toxic chemicals, radioactive materials, other pollution, hazardous activities, potential damage from soil or other differential ground movements, ground water, inadequate surface drainage, flood, erosion, excessive noise, defective lead base paint (24 CFR Part 35) and other hazards on or off site.

Primary Reference for articles in this section are HUD Handbook 4150.1 REV-1 Chapter 4, and HUD Handbook 4150.2 Section 2-2.

Copy Printed: 9/15/2014

REVISION I

A. Airports

- 1. Airport Noise
 - **a.** Properties are not to be rejected solely because of airport influences (noise) if there is evidence of acceptance in the market and if use of the dwellings is expected to continue. Special consideration should be given to determine if there is indication that adverse changes in market attitude are taking place in the area.
- 2. Hazards Runway Clear Zones (aka Runway Protection Zones) at Civil Airports or Clear Zones or Accident Potential Zone I at Military Airfields.
 - **a.** All dwellings are acceptable provided the prospective purchaser acknowledges awareness that the property is located in a Runway Clear Zone/Clear Zone. See <u>HUD Handbook 4150.1</u>, <u>Rev-1</u>, <u>Sections 4-26</u> for a sample of the buyers acknowledgment certification. This notification must be provided to the prospective purchaser at the time loan application is initiated. (Also see section titled "Hazards and Nuisances")
 - **b.** Properties located in Accident Potential Zone I at military airfields may be eligible. See HUD Handbook 4150.2, Section 2-2 for details.

B. Railroad Tracks and Other High Noise Sources -

- 1. New Construction (The definition of new construction includes proposed, under construction and less than one year old.) Appraisers and builders are to pay particular attention to Item 1.b. "Noise" on form HUD-92541, Builder's Certification of Plans, Specifications & Site.
- **2.** Existing Construction (over 1 year of age) Noise exposure by itself will not necessarily result in the rejection of the property for FHA financing. Marketability factors should be considered.
- **3.** For all single family dwellings FHA does not require noise assessment or acoustical analysis. HUD no longer have noise requirements (Ldn/dba) for single family dwellings, this does not include condominium projects.
- **C. Flood Zones and Insurance** General Requirements can be found in: <u>Mortgagee Letter 90-16</u> (existing properties over 1 year old), <u>HUD Handbook 4150.1</u>, <u>REV-1</u>, <u>Section 4-23</u>, <u>HUD Handbook 4150.2 Section 2-2</u> and <u>Mortgagee Letter 99-34 for new construction (not applicable to condominium projects)</u>.

Appraisers are required to verify whether the subject property is located in a designated flood zone and indicate the designation on the appraisal form.

- **D.** Lead-Based Paint Surfaces <u>HUD Handbook 4150.2</u>, <u>Section 3-6A.17</u>, <u>Mortgagee Letter 96-67</u> and <u>Mortgagee Letter 00-01</u>.
 - 1. General Requirements For all properties built before January 1, 1978, the appraiser must inspect ALL interior and exterior surfaces, such as walls, stairs, deck, porch, railing, eaves, windows, doors, fences, detached garages and other outbuildings and appurtenant structures for defective paint surfaces (i.e. chipping, peeling or flaking paint).
 - 2. For condominium units, the appraiser needs to inspect the interior of the unit and exterior surfaces and appurtenant structures of the specific unit being appraised.

Copy Printed: 9/15/2014

REVISION I

1—18

- 3. Refinances with an appraisal are also subject to this inspection and abatement procedure.
- 4. Properties built between 1950 and 1978 that involve a VA-CRV must be inspected for lead based paint. <u>HUD Handbook 4150.1, Rev-1, 5-14.D.</u>
- **E.** Radon Currently, HUD does not require radon testing of homes that are being insured under the FHA mortgage insurance program.
- **F.** Overhead High Voltage Transmission Towers & Lines The appraiser must indicate whether the dwelling or related property improvements is located within the easement serving a high-voltage transmission line, radio/TV transmission tower, cell phone tower, microwave relay dish or tower, or satellite dish (radio, TV cable, etc). If the dwelling or related property improvements is located within such an easement, the DE Underwriter must obtain a letter from the owner or operator of the tower indicating that the dwelling and its related property improvements are not located within the tower's (engineered) fall distance in order to waive this requirement.
- G. Operating & Abandoned Oil & Gas Well/Tanks/Pressure Lines HUD Handbook 4150.2 Section 2-2.D.

Operating and abandoned oil and gas wells pose potential hazards to housing, including potential fire, explosion, spray and other pollution. Therefore, no dwelling may be located closer than 300 feet from an active or planned drilling site or 75 feet from an operating well; this applies to the site boundary, not to the actual well location.

1. Underground Tanks -

If an underground tank has been abandoned, its removal or proper abandonment is required.

- a. The appraiser should use a VC, indicate the location of the tank, and require evidence that the subject's vacated tank has been removed or properly abandoned.
- b. Generally, the local jurisdiction may have established requirements. If not, the tank must be removed or abandoned per the recommendations issued by the applicable State.
- **2.** Hydrogen Sulfide Gas (Sour Gas Wells) are extremely hazardous. See HUD Handbook 4150.2, Section 2-2.D. "Special Case ..." for instructions.
- **3. Stationary Tanks** If the property is within 300 feet of a stationary storage tank containing more than 1000 gallons of flammable or explosive materials the location may be determined ineligible by the lender. See HUD Handbook 4150.2, Section 2-2.M. HUD approved lenders are responsible to determine the acceptability of a dwelling when the health and safety of the occupants or the continued marketability of the property may be in jeopardy.
- H. Insulation Materials See HUD Handbook 4150.1 Chapter 12
 - 1. Asbestos Insulation Asbestos used as roof shingles or siding on a house does not pose a danger as would be if the material were deteriorating within the confines of

Copy Printed: 9/15/2014

REVISION I

a home. When used as a wrap for hot water pipes, it is usually covered and poses no danger. When the material is deteriorating into a fine powder and can be inhaled, it may pose a danger to one's health.

Asbestos wrapping around hot water pipes in the basement of a dwelling may be found in older homes. If an appraiser notices this, he/she should make a note on the appraisal report that there appears to be asbestos insulation wrap around the hot water pipes. If there is not obvious deterioration of the asbestos such as punctures or other damage, it should be left alone. If there is obvious damage, the appraiser should annotate the valuation condition sheet and the lender should require an inspection by a professional in that field.

2. Foam Plastic Or Foam Core - See HUD Handbook 4150.1, P. 12-20, Section 20-21

- I. Lava Flow Zones Based upon potential volcano activity, FHA mortgage insurance is not available in lava flow zones 1 and 2 Areas.
 - 1. Island of Hawaii In 1971 HUD established a policy which responded to volcanic hazards on the Island of Hawaii. Under this policy certain areas were identified as being unacceptable for HUD programs. This policy was re-evaluated and the findings were posted in 1991. Except for a newly designated area to the northeast of Mauna Loa, the 1990 and 1971 HUD non-participation areas are not significantly changed in location or extent. The 1990 boundaries are more closely based on known geologic features and current estimates of the U.S.G.S. Hawaiian Volcano Observatory. HUD, in consultation with U.S.G.S. geologists at the Menlo Park Center in California and at the Volcano Observatory, reviewed 20 volcanic zones involving lava flows, subsidence and ground fracture, tephra falls, volcanic gas, and pyroclastic surge. Ultimately HUD identified two zones as being particularly hazardous. These are defined by the U.S.G.S. Observatory as lava flow zones # 1 and #2.

"Zone #1 consists of the summit areas and active parts of the rift zones of Kilaua and Mauna Loa..."*

"Zone #2 consists of several areas that are adjacent to and downslope from the active rift zones of Kilaua and Mauna Loa and therefore are subject to burial by lava flows of even small volume eruptions in those rift zones."*

It was concluded that these two zones should be classified as non-participation areas for the purpose of HUD program assistance. For the purpose of simplification and ease of administration the two zones were integrated so that a single (composite) zone or non-participation boundary line provides the basis for HUD's volcanic hazard policy.

Most of the HUD non-participation area falls within parks, conservation areas, or other state and federally-owned lands where housing and other urban uses are prohibited. However, a limited extent of the non-participation area will not be enclosed by federal or state lands. In these areas we must rely entirely upon lava flow boundaries for zones #1 and #2, as defined by the U.S.G.S.

Hawaiian Lava Flow Maps and other information on this can be located on line at the USGS (U.S. Geological Survey) Hawaiian Volcano Observatory site. http://hvo.wr.usgs.gov Select Lava Zones. (*Mullineaux, D. R., Peterson, D. W., and Crandell, D. R., 1985, Volcanic Hazards in the Hawaiian Islands.)

J. Avalanche Hazards - Code of Federal Regulations (CFR) 200.926d(b)(3) requires that the property shall be free of those foreseeable hazards or adverse condition which may affect the health and safety of the occupants or the structural soundness of the property. It has been determined that this includes properties in avalanche slide or runout areas.

Property located in either the Red or Blue Zones are ineligible for FHA insurance and should be rejected. Red Zones (Black/extreme on some maps) are those that have positive danger and are in the path of a routine slide (less than a 100 year occurrence probability). Blue Zone (Red/high on some maps) is an area identified as having the potential for snow blast damage in a 100 year slide but limited probability to cause severe damage to a structure. More on these zones can be found at the free web sites listed as references below.

Due to the extreme hazards to the health and safety of the occupants, the Department will not entertain request for waivers of this requirement unless it has been determined that construction of diversionary structures (engineered and constructed in accordance with plans by an approved Avalanche Specialist) have been constructed.

Reference: "Mears Avalanche Assessment for Anchorage", Avalanche Zoning by Art Mears found at

http://www.avalanche.org/~moonstone/zoning/AVALANCHE%20ZONING.htm and "City (Juneau) and Borough Avalanche Assessment". United States Avalanche Danger Descriptors can be found at http://www.avalanche.org/usdanger.htm

UTILITIES

To access information quickly click on one of the following:

A. Utilities Not On - HUD Handbook 4150.1, Rev-1, Section 5-19

When utilities (water, gas, electric) are NOT on at the time of appraisal, the appraiser is to condition on the Valuation Condition sheet for a certification stating that all utilities have been tested and that they appear to be in good working order. The certification must be done by an FHA roster appraiser, a home inspector, an inspector from the local building department, an FHA compliance inspector, a professional in the specific field (e.g. electrician, plumber), or another person determined to be qualified by the DE.

NOTE: The appraiser will also annotate on the VC sheet, that additional repair requirement may apply once all the utilities are on and fully functional.

Copy Printed: 9/15/2014

REVISION I

1-21

SEWAGE SYSTEMS

To access information quickly click on one of the following:

- A. Community Sewer Systems
- B. Individual Sewage Systems

A. Community Sewer Systems

HUD no longer maintain list of approved systems. The appraiser must note on the URAR the name of the community system(s). The lender is responsible to ensure the community system(s) are licensed and adequate to service the property.

B. Individual Sewage Systems

- General.
 - **a.** For properties that cannot connect to a public system and are served by an individual sewage system that is acceptable to the local health authority, the system is then acceptable to HUD/FHA. This includes numerous types of sewage systems including cesspools, individual pit privies, and mound systems.
 - **b.** Certifications are only required if the appraiser suspects a problem with the system, or problems are customary in the area. In those instances, the appraiser is to condition for a certification by the local health authority, a licensed sanitarian or an individual determined to be qualified by the DE Underwriter.
 - **c.** Appraiser's site sketch should indicate approximate location of individual systems and leach fields. See the section of this manual titled <u>Appraisal Package</u>.
 - **d.** For distances between water sources and sewage, see HUD Handbook 4150.2 Section 3-6 and CFR 200.926d.

References: HUD Handbook 4150.1, REV-1, Section 12-16, 4905.1 REV-1, HUD Handbook 4150.2 Section 3-6.

WATER SYSTEMS

To access information quickly click on one of the following:

A. Community Water Systems

Copy Printed: 9/15/2014

REVISION I

1-22

B. Individual Water Systems

C. Shared Wells

- A. Community Water System Is a central system, owned, operated and maintained by a private corporation or a non-profit property owners association. HUD no longer maintain list of approved systems.
 - 1. If on community water, the appraiser must note on the URAR the name of the water company. The lender is responsible to ensure the community system(s) are licensed and adequate to service the property.

B. Individual Water Systems

1. General Requirements:

- a. Refer to the section of this guide titled Utilities, <u>Connection to Public & Community Utilities</u>, to see when connection to a public or community system is required. HUD Handbook 4905.1 REV-1, 2-5.B.2 and 4150.2
- **b.** Individual water supply systems (wells) may be acceptable when connection to a public or community water system is not available and there is assurance of a continuing adequate supply of safe potable water for domestic needs, and shall also include auxiliary uses for lawn and garden maintenance.
- **c.** The appraiser is responsible to ensure that certifications of water quality and quantity are provided to the lender for proper processing and determination of final acceptability. As such, the appraiser should condition his/her appraisal for the appropriate Health Authority approval and pump test.

2. Water Quality Mortgagee Letter 95-34.

- **a.** Individual water wells are owned and maintained by the homeowner, and are subject to compliance with all requirements of the local and or State Health Authority having jurisdiction.
- **b.** HUD testing requirements, as stated in Mortgagee Letter 95-34, are the minimum standards acceptable for FHA insured mortgages. This includes at a **minimum** lead, (first flush) nitrate, nitrite, total nitrate/nitrite, total coliforms, and fecal coliforms or E.coli. If state and local agencies impose **additional** standards, they too must be met.
- **c.** All test sample should be taken by a state-certified private laboratory or their designee in accordance with the State drinking water regulations.
- **3. Well Location -** Individual water supply systems (wells) should be checked to establish the distance from the septic system.

The Appraiser's site sketch should indicate approximate location of individual systems and leach fields. See the section of this manual titled <u>Appraisal Package</u>

- **a.** A well located within the foundation walls of a dwelling is not acceptable except in arctic or sub-arctic regions.
- **b.** Water which comes from any soil formation which may be polluted, contaminated, fissured, creviced or less than 20 ft. below the natural ground surface is not acceptable, unless acceptable to the local health authority. Certification of such is required in the insuring package.

- **c.** Individual water supply systems are not acceptable for individual lots in areas where chemical soil poisoning has been or is practiced if the overburden of soil between the ground surface and the water bearing strata is coarse grained sand, gravel, or porous rock, or is creviced in a manner which will permit the recharge water to carry the toxicants into the zone of saturation.
- **d.** The following shall be used in establishing the **minimum** acceptable distance between wells and sources of pollution located on either the same or adjoining lots. These distances may be increased by either the health authority having jurisdiction or HUD.

Distance From Source of Pollution

Source of pollution	Minimum horizontal
(i) distance (feet)	
Property Line	
Septic Tank	
Absorption Field	
Seepage Pit	
Absorption Bed	
Sewer Lines w/Permanent Watertight Joints	
Other Sewer Lines	
Chemically Poisoned Soil	(SUP3)25
Dry Well	
Other	

Supplemental requirement notes*

- (SUP1) This clearance may be increased or decreased depending upon soil and rock penetrated by the well and aquifer conditions. The clearance may be increased in creviced limestone and permeable strata of gravel and sand. The clearance may be reduced to 50 ft. only where the ground surface is effectively separated from the water bearing formation by an extensive, continuous and impervious strata of clay, hardpan, or rock. The well shall be constructed so as to prevent the entrance of surface water and contaminants.
- (SUP2) The recommendations or requirements of the local health authority shall apply.
- (SUP3) This clearance may be reduced to 15 feet only where the ground surface is effectively separated from the water bearing formation by an extensive, continuous and impervious strata of clay, hardpan, or rock.
 - **a.** Individual Water Systems/Wells should be located ON the subject property site. If not, they must be on an adjacent property, and evidence of water rights and recorded maintenance agreement must be provided for acceptance of the well as the primary source of water for an FHA insured property.
 - **b.** Additional distance information may be referenced from HUD Handbook 4910.1, Appendix K, and 24CFR Sec. 200.926d.
 - **c. Cisterns-** HUD Handbook 4150.2 Section 3-6 indicates that properties served by cisterns are not acceptable for mortgage insurance. However, the

Copy Printed: 9/15/2014

REVISION I

1-24

HOCs have the authority to consider waivers in areas where cisterns are typical. Link to HOC policy on cisterns.

Additional information may be researched in <u>HUD Handbook 4150.1, Rev-1, Sec. 12-16 and 12-17 and 4075.12 REV., 4150.2 Section 3-6, 24CFR 200.926(f)</u>) "General Acceptability" (or <u>HUD Handbook 4150.2</u>)

2. Miscellaneous Individual Well Items

- a. New wells must be drilled, no less than 20 feet deep, and cased. Casing should be steel or other casing material that is durable, leak-proof, and acceptable to (either) the local health authority and (or) the trade or profession licensed to drill and repair wells in the local jurisdiction. Additional information on new wells, pumps, and storage tanks construction information may be referenced from HHDD Handbook 4910.1, Appendix K and 24CFR 200.926d(f)
- **b.** Individual Residential Water Purification Equipment If a property is otherwise eligible for insurance but does not have access to a continuing supply of safe and potable water without the use of a water purification system, the requirements in Mortgagee Letter 92-18 and 95-34 must be satisfied.
- **F. Shared Wells -** Shared wells may serve existing properties which cannot feasibly be connected to an acceptable public or community water supply system. A shared well shall have a valve on each dwelling service line as it leaves the well. A shared well shall service **no more than four** living units or properties. A shared well must have a shared well agreement and shall be binding upon signatory parties and their successors in title. More information on this agreement can be referenced in HUD Handbook 4150.1 Rev-1, Section 12-16.

REPAIR CONDITIONS

To access information quickly click on one of the following:

- A. Home Inspections
- B. Condition Sheet
- C. Excessive Conditions Required
- D. Code Enforcement for Existing Properties
- E. Clearing Conditions on Existing Homes
- F. Refinances

See HUD Handbook 4150.2and Mortgagee Letter 97-22.

A. Home Inspections

Borrowers should be encouraged to obtain a detailed home inspection of the property. Borrowers should complete sufficient research of home inspector's qualifications and

Copy Printed: 9/15/2014

REVISION I

1-25

designations to ascertain that they feel comfortable with the individual they hire. HUD does not maintain lists of approved Home Inspectors.

B. Valuation Condition Sheet (form HUD-92564-VC) - Repairs and other conditions of the appraisal are to be indicated on the "Valuation Condition (VC) Sheet" found on line at HUDClips http://www.hudclips.org/subscriber/html/forms.htm or REAC's site at http://www.hud.gov/reac/appraisal_form.html (Legal size paper is needed to print this form.) Handbook 4150.2 provides instructions on the completion of the this form.

C. Excessive Conditions Required -

1. Requiring Repairs -

- a. Required repairs are limited to those repairs necessary to preserve the continued marketability of the property and to protect the health and safety of the occupants. The three S's:
 - 1) Salability preserve the continued marketability of the property
 - 2) Safety protect the health and safety of the occupants
 - 3) Security protect the security of the property (security for the FHA insured
- mortgage.)

 b. Avoid unnecessary requirements because they increase housing costs without adding any basic amenities to the property.
- c. While appraisers are not to add repairs beyond FHA's guidelines, the Underwriter (Mortgagee) may add requirements as a condition of making the loan. Individual mortgagees have the right to make additional requirements they feel necessary to protect their investment. The applicant has the option of selecting another lender if they feel these requirements/conditions are excessive.
- **2. Poor Condition Properties -** If the subject property is in such poor condition that it may be cost prohibitive or impractical to bring it up to FHA's minimum property requirements, the appraiser should recommend **Rejecting** the property and:
- a. Complete the appraisal on an "AS IS" basis, clearly marking the report as rejected for Section 203(b) and provide reasons for the rejection;
- b. Provide a list of all major deficiencies and state that the list should not be considered all inclusive. Additional items may be required before acceptable for FHA Insurance; and
 - c. Provide photographs if possible.
- **D.** Code Enforcement for Existing Properties As stated in <u>HUD Handbook 4150.2</u> HUD has neither the authority nor responsibility for enforcing code. This rests with the local municipalities.

E. Clearing Conditions on Existing Homes - (<u>HUD Handbook 4000.2 REV-2</u>, <u>Section 2-19</u>.)

1. All repair items required by the appraiser or underwriter must be inspected and the clearance documented.

The form HUD-92564-VC states "A professionally licensed, bonded, registered engineer, licensed home inspector or appropriately registered/licensed trades person, as applicable, must provide documentation that all deficiencies have been acceptably corrected upon completion of repairs." "As applicable" has been determined to mean any individual who the lender deems to be qualified.

Professionals as defined above may use their company's forms and letterhead to make the certifications. Appraisers and fee inspectors are to use the Compliance Inspection Report, HUD-92051. The individual signing Section II must be the person who actually performed the

Copy Printed: 9/15/2014

REVISION I Revision Effective: 05-30-00 inspection. Section III or IV, as appropriate, is to be signed by the Direct Endorsement Underwriter.

- **a.** Mortgagee Certification When a Mortgagee Certification is used to clear minor conditions the HUD-92051 must be used.
- 2. Mechanical Certifications See Heating & Electrical section of this manual.
- **B. Refinances** (See section on <u>Appraising Refinances</u>.) All refinances require a complete appraisal with repair conditions. Although HUD does not require completion of the repairs on a streamline refinance, except lead based paint repairs, the lender may require completion of repairs. A streamline refinance may be insured with or without an appraisal. <u>Handbook 4155.1</u>, Rev. 4 Chpt. 1, and <u>Mortgagee Letter 96-10</u>

PEST CONTROL

To access information quickly, click on one of the following:

- A. Requiring Reports and Treatment
- B. Appraiser's Observations
- C. Sectioned Reports and Condition Clearance

A. Requiring Reports and Treatment

Wood destroying insects and other organisms can cause serious problems in the wood structural components of a house and may go undetected for a long period of time. FHA requires maximum assurance that a home is free of any infestation.

Click here to determine if your location must comply.

1. New Construction - The Department's policy concerning the requirement for builder's warranty against termite infestation in new homes is outlined in Mortgagee Letter 99-03. All chemical soil treatments, bait systems, and chemical wood treatment must be approved by the Environmental Protection Agency (EPA) and applied in accordance with the EPA label instructions. When these methods of protection are provided, the NPCA-99a form is to be completed in accordance with the Mortgagee Letter. However, in some cases it is not feasible for a builder to arrange for soil treatment. In this regard, the National CABO code allows a builder to utilize pressure treated wood as a measure of termite protection. If pressure treated wood is used, however, it must be used in all framing members up to and including the top plate of the first floor level wall. This includes the subfloor and floor joists of the first floor. The use of pressure treated wood in only the sill plate is not acceptable. When using pressure treated wood, the NPCA-99a form is not to be used. In such cases, the builder must provide the lender with a letter stating that the house is protected from termites by the use of pressure treated wood. The builder must also provide the home buyer with a one year warranty against termites similar to that required on the NPCA-99a form.

New Construction = Proposed construction, under construction and existing less than 1 year old.

Copy Printed: 9/15/2014

REVISION I Revision Effective: 05-30-00

- a. For new construction in affected areas, one of the following must be used:
 - 1. Soil treatment, NPCA-99b, PLUS one year guarantee NPCA-99a; OR.
 - 2. Bait system/Wood PLUS NPCA-99a; OR
 - Any construction determined not requiring termite protection by the CABO
 One and Two Family Dwelling Code (i.e., steel frame or concrete structures,
 or structures built of pressure treated or termite resistant wood with only
 minor interior wood trim. Roof sheathing may be untreated wood).
 - b. The use of post-construction soil treatment where the chemicals are applied only around the perimeter of the foundation is NOT acceptable in new construction.
- 2. Existing (over 1 year old) For existing construction in affected areas, Form NPCA-1, Wood Destroying Insect Infestation Inspection Report, or a state mandated form, will be required and will be valid for 90 days from the date of the inspection. (Mortgagee Letter 95-33)
- 3. Condominiums NPCA-1 is required on first floor units only. If the unit is on the second floor or above, then a termite inspection is not required (to include ground floor attached and or detached garage, shed, and other structure that are apart of the subject) <u>INSPECTION IS REQUIRED</u>
- **B.** Appraiser's Observations Appraisers are to observe all areas of the house and other structures/areas within the legal boundaries of the property that have potential for infestation by termites and other wood destroying organisms, including the bottoms of exterior doors and frames, wood siding in contact with the ground and crawl spaces. Mud tunnels running from the ground up the side of the house may indicate termite infestation. Observe the eave and gable vents and wood window sills for indication of the entrance of swarming termites and note excessive dampness or large areas where the vegetation is dead. Evidence of active termite infestation must be noted.
- C. Sectioned Reports and Condition Clearance The following are guidelines for clearance of termite report conditions in states where section termite reports are provided. On these reports each finding/recommendation will be noted in either Section I or Section II, or the equivalent.
 - 1. Sections
 - a. Section I contains items where there is evidence of active infestation, infection or conditions that have resulted in or from infestation or infection.
 - b. Section II items are conditions deemed likely to lead to infestation or infection, but where no visible evidence of such was found. The Structural Pest Control Board has advised that Section II items will probably be major items which have not become infestations/infections, but possibly will become in the future.

Link to HOC's procedures for clearing Sectioned Pest Reports.

			Assert March 19
\neg	^ FO		TTICS
		X. /\	1 1 11 🛰
-1	$\mathbf{O}_{\mathbf{I}}$	un	

Copy Printed: 9/15/2014

REVISION I

1-28

To access information quickly, click on one of the following:

A. Roofs

B. Attics

- A. Roofs The covering must prevent moisture from entering and provide reasonable future utility, durability and economy of maintenance. The appraiser must visually examine the roof to determine whether deficiencies present a health and safety hazard or do not allow for reasonable future utility. (4905.1 REV-1, 2-12.)
 - 1. Life Expectancy: The appraiser must exercise sound judgment when evaluating roof condition. The roof should have a remaining physical life of at least two years. If the roof has less than two years remaining life, then the appraiser must call for reroofing or repair. The condition must clearly state whether the subject is to be repaired or re-roofed.

2. Snow Covered Roofs

- a. In areas where the snow is likely to lay for more than a few days:
 - 1) The appraiser is required to make an extra thorough inspection of the attic and all visible roofing areas for signs of failing roofing materials.
 - 2) If there is evidence of damage and/or leaks the appraiser is to condition appropriately for correction(s).
 - 3) If there is no evidence of damage and/or water leaks. The borrower must be informed that the roof was snow covered at the time of the appraisal and that it is acceptable to the purchaser without any warranty or guarantees from HUD/FHA.
 - 4) If the borrower has concerns, they can request the seller to shovel the roof for inspection by a qualified roofer. If damage occurs during shoveling, it is between the buyer and seller to resolve.
- **b.** In areas where the snow is **not likely** to lay for more than a few days a clear roof inspection is to be obtained prior to closing.
 - 1) The appraiser is required to make an extra thorough inspection of the attic and all visible roofing areas for signs of failing roofing materials and call for a clear roofing inspection.
 - 2) If the Underwriter determines, due to unusual weather conditions, it is not possible to obtain the clear inspection prior to closing, then the purchaser and seller are to sign an acknowledgment that indicates:
 - i) The roof was covered with snow at the time of the appraisal inspection,
 - ii) The snow is likely to continue to cover the roof for several more days and that the roof cannot be inspected prior to loan closing
 - iii) HUD/FHA makes no guarantees or warranties as to the roof's condition.
 - 3) A clear roof inspection must then be obtained prior to submission for FHA Insurance or an escrow account equal to 1 ½ times the cost of a new roof is to be established in the event repairs or a new roof is found to be needed when the inspection takes place. (Certification is to be in the insuring package.)

3. Re-Roofing

REVISION I

- **a.** FHA will accept a maximum of 3 layers of existing roofing. If more than 2 layers exist **and** repair is necessary, then all old roofing must be removed as part of the re-roofing. (4905.1 REV-1, 2-12)
- **4. Inspections -** Certification as to the condition of the roof and the completion of work requirements should be made by a person determined to be qualified by the lender.
- **5. Valuation of Roof -** Appraisers are expected to know the market value of the different roofing types in the area of the subject. For example in one market homes with wood shingles may reap a higher price than those with composition shingles, while in another they may be equal or the wood may even be less desirable. When evaluating the quality of the roof, items like multiple layering and composition over wood must be considered. Should the appraisal value be based on the conditions that the subject will have a new roof the appraiser needs to clearly indicate the type of roofing being valued.
 - **a.** All **flat roofs** require an inspection as identified in item 4 above. This includes roofs on any structure on the property except open pole style patios that appear to be in good condition. If the subject is part of a large multifamily buildings, i.e. condominiums, no roof inspection is required. If the subject is in a small 4 unit building or is a townhouse type unit covered by a condo association with the subject property having its own roof, then a roof inspection is required. (This does not include PUDs as they are considered single family in their nature.)

B. Attics -

- 1. Access It is the homeowner/seller's responsibility to provide clear access to these areas. FHA appraisers are required to observe the attic area and will likely need to have a ladder to gain attic access.
- 2. When there is no safe access to the attic the appraiser is to mark VC-2 to require access. (Mortgagee Letter 97-22)

Do not require attic access openings for mobile homes and dwellings with little or no attic area (due to interior roof slope).

REF: HUD Handbook 4150.1 Rev-1, Section 8-2.E. (or HUD Handbook 4150.2)

3. Inspection - The attic must be examined whether access is by pull-down stairway or scuttle. At a minimum, the appraiser must enter head and shoulders into the attic.

CRAWL SPACE & FOUNDATIONS

To access information quickly click on one of the following:

A. Basements

Copy Printed: 9/15/2014

REVISION I Revision Effective: 05-30-00

B. Crawl Space

HUD Handbook 4150.2, Section 3-6A.11, HUD Handbook 4905.1, Rev-1,

- **A.** Basements Basements must be examined for dampness or wetness, any obvious structural problems and the condition of the furnace, hot water heater or other components located there.
 - 1. Sump Pumps in Crawl Space and Basement Areas Sump pumps are acceptable to HUD provided that they are properly functioning at the time of appraisal. A sump pump may be hard-wired by an acceptable wiring method or may have a factory electrical cord which is to be connected to a receptacle suitable for such use. The receptacle must be located to allow connection to the factory wiring without the use of an extension cord. NOTE: A sump pump is not a cure-all. If there is significant incurable ponding of water in basements or crawl spaces, the underwriter may elect to reject the property.
- **B.** Crawl Space General Requirements <u>HUD Handbooks 4905.1 REV-1, 2-14 & 2-11</u> and 4150.2, Section 3-6A11 In order to ensure against conditions which could cause deterioration to the building and seriously affect the marketability of the property, it is required that:
 - 1. There must be adequate access to the crawl space.
 - 2. The appraiser will enter the crawl space at a minimum entry of the head and shoulders to observe conditions, except when access is obstructed, when entry could damage the property, or when dangerous and adverse situations are suspected.
 - **3.** It is highly recommended that the minimum height of a crawl space be 18 inches from the bottom of the joists.
 - **4.** The crawl space must be clear of all debris and properly vented.
 - **5.** The crawl space must not be excessively damp and must not have any water ponding.
 - **6.** The crawl space must be adequately ventilated, providing positive airflow with no dead air space. A vapor barrier is not typically required; however, if moisture problems are evident, a vapor barrier should be required.

HEATING & ELECTRICAL

To access information quickly click on one of the following:

- A. Electrical Service
- B. Mechanical Certifications
- C. Heating

Copy Printed: 9/15/2014

REVISION I

A. Electrical service -

- 1. May be either circuit breakers or fuses.
- **2.** Appraisers should examine the electrical box to ensure that there are no frayed or exposed wires.
- **3.** Existing 60-amp service is acceptable if it appears that this is adequate amperage for the appliances present in the property, or those considered "standard" if the present appliances appear to be less than found in the "standard" home.
- **4.** Knob and tube wiring is acceptable if found to be in good condition and a minimum of 60-amps.
- **B.** Mechanical Certifications (Also see section titled "Utilities") Electrical, plumbing and/or heating certifications may be called for by the appraiser when he/she cannot determine if one or all of these systems are working properly. An appraiser should not arbitrarily call for such certifications as they are still responsible for checking on the adequacy of these systems at the time of appraisal.

The certification must be done by a home inspector, an inspector from the local building department, an FHA compliance inspector, a professional in the specific field (e.g. electrician, plumber) or any individual deemed to be qualified by the Direct Endorsement underwriter.

C. Heating

- 1. General ALL habitable rooms must have a heat source. This does not mean that each room must contain a heating device but that each room must receive sufficient heat.
- 2. Wood Stoves and Solar Systems

Dwellings with wood burning stoves or solar systems as a primary heat source must have permanently installed conventional heating systems that can maintain at least 50 degrees Fahrenheit in all living areas and those containing plumbing systems. These systems must be installed in accordance with the manufacturer's recommendations.

- **3.** Floor Heaters Due to the inherit dangers of a floor heater it is highly recommended that floor heaters in need of repair be replaced with another permanent heat source.
- **4.** Non-Conventional Heating Systems All non-conventional heating systems space heaters and others must comply with local jurisdictional guidelines. Often these are not acceptable as the primary source of heat.
- **5.** Propane tanks must be a safe distance from the dwelling. Leased tanks are acceptable when not offered for sale. **Propane fired furnaces located in a crawl space area is not acceptable**.

WATER HEATER

A. Requirements -

1. All water heaters must have a non-adjustable temperature and pressure-relief valve.

Copy Printed: 9/15/2014

REVISION I

1--32

- 2. The water heater must comply with local building codes regardless of its location.
- 3. Rental water heaters are not acceptable.

COMPREHENSIVE VALUATION (APPRAISAL) PACKAGE

To access information quickly click on one of the following:

- A. Contents of the Comprehensive Valuation (Appraisal) Package, aka CVP
- B. Submission of CVP
- A. Contents of the Comprehensive Valuation Package (CVP)
 - 1. Part 1 of the Comprehensive Valuation Package.
 - a. **Uniform Residential Appraisal Report** (URAR)FNMA 1004. The FNMA 1025-Small Residential Income Property Appraisal Report and FNMA 1073-Individual Condominium Appraisal Report may be used, instead of the URAR when applicable (Mortgagee Letter 97-22).
- b. **Addendum** to Appraisal Report with supporting documentation, when applicable.
 - c. Local map identifying location of subject and comparable properties.
- d. **Sketch** should include all exterior dimensions of the subject property as well as patios, porches, garages, breezeways and other offsets. State "covered "or "uncovered" to indicate a roof or no roof such as over a porch. In cases of obsolescence the appraiser may wish to sketch the subject property's floor plan with interior rooms identified. Also, the appraiser should indicate the approximate location of individual systems, i.e. wells, septic and leach fields.
- e. **Photographs** showing the front, rear, sides, and street scene of the subject and a photograph of the front of each comparable property.
- f. **Cost Approach** for all single family one to four dwellings to include Planned Unit Development units that are proposed, under construction and existing less than one year old.
- g. A separate **Gross Rent Multiplier** analysis for 3 & 4 unit properties or FNMA Form 1025. See section on Gross Rent Multiplier for more information.
 - h. Appraiser Certification and Statement of Limiting Conditions
- i. Appraisals performed on manufactured homes must meet the criteria in Sections 8-0 through 8-2 of HUD Handbook 4150.2 and the "Manufactured Home" section of this guide. (Sections 8-3 and 8-4 of the 4150.2 are for manufactured homes appraised under HUD's Title I program.)
- k. **Electronic Signatures** (Mortgagee Letter 95-50) HUD accepts the procedure of electronically affixing a signature to an appraisal report, provided certain security measures are taken. In conformance with the Appraisal Standards Board's (ASB) Standard No. 8, all appraisers electronically signing a report must have a digital signature security feature built into their software program. The appraiser should ensure their signature is protected and only the appraiser maintains control of their signature. This control may be maintained by a personalized identification number, security cards or other hardware devices, where the appraiser has sole personalized control of affixing their signature. Electronically affixing a signature to an appraisal report carries the same level of authenticity and responsibility as an appraisal report with an ink

Copy Printed: 9/15/2014

REVISION I

1--33

signature. (Note: Appraisal trainees shall not sign on the appraisal report in any capacity. Mortgagee Letter 94-54)

- 2. Part II **National Valuation Condition** (VC) Sheet (HUD92564-VC) -Required in all appraisal packages. (http://www.hud.gov/reac/appraisal form.html Legal size paper is needed to print this form.)
 - 3. Part III Homebuyer Summary (HUD-92564-HS)
- B. Submission of Appraisal Package(s) See Mortgagee Letter 98-13
- 1. At least two complete CVPs will be submitted to the lender for inclusion into the insuring file. At least one of these may be used by HUD to conduct reviews of the appraisal.
- 2. **Electronic transmission** of an appraisal report will be between appraisers and lenders. Appraisal reports will not and cannot be received by HUD electronically. Electronic signatures and electronic transmission does not eliminate the appraiser's responsibility of supply a complete appraisal package for HUD's review. This is one of the sets submitted to the lender. (The old copy 6.) (Mortgagee Letter 95-50)

Note: The lender selected appraiser is required to personally visit the subject property and all comparables used in the appraisal report. Having someone else inspect and or take pictures of the subject property and or comparables is not acceptable. The lender selected appraiser who performed the appraisal and made the inspection must personally sign the appraisal report. An appraisal trainees shall not sign on the appraisal report in any capacity.

REVISION I

1-34





Arts and Activism

Arts and Education

Literary Arts

Visual Arts

Interviews and Conversations

About EnviroArts

EnviroArts Home

Cell-Phone Towers and Communities: The Struggle for Local Control

by B. Blake Levitt

The Telecommunications Act of 1996 was the size of the Manhattan phone directory. At the time it was being debated, most people, including many legislators voting on it, thought it was only about complex deregulation schemes. But deep within its pages, in Section 704, lay a stealth clause about the siting of cell-phone towers that is creating a planning and zoning nightmare--and perhaps a public health problem, according to some scientists, journalists, and activists.

Inserted at the behest of the telecommunications conglomerates, whose representatives helped write the legislation, Section 704 states that although communities reserve their rights over the general placement, construction, and modification of towers, they cannot ban them outright. Nor can they unreasonably discriminate among providers, or set zoning regulations based on "the environmental effects of radio-frequency emissions, to the extent that such facilities comply with the FCC [Federal Communications Commission] regulations concerning such emissions." As for health effects on humans, the intent was to include them in the catch-all category "environmental effects," although no other industry, including the U.S. military, interprets the term in that way. Section 704 further states that all refusals must be "reasonable" and in writing.

Zoning officials today are caught between a rock and a hard place when it comes to siting cellular-phone towers or other antenna installations mounted on, or in, pre-existing buildings. Legally, they can't refuse them or, supposedly, design zoning regulations based on health effects, no matter how convincing the scientific evidence or how militant community members become. Any community that tries to challenge the safety of cellular towers based on the "environmental" effects of radio-frequency (RF) emissions stands to end up in federal court. Several communities already have.

The situation is dividing communities around the country, often pitting neighbor against neighbor when one is tempted by the licensing revenues of siting such a facility on their property, while adjacent landowners raise concerns about property devaluation and health endangerment. Communities used to be able to turn down such towers, but now this is no longer so.

Critics say it is the biggest land-grab in one industry's favor at the federal level since the buildout of the railroads at the turn of the last century. Others say it is a flagrant challenge to the Fifth and Tenth Amendments of the U.S. Constitution. And now those who are silenced at public hearings from speaking out about health effects point to First Amendment violations too. Legal challenges are currently making their way through the courts, the most promising of which was filed in federal court by a group of concerned citizens in conjunction with the Communications Workers of America and a group of "electrically sensitive"

people, who have allergic-like reactions to electromagnetic fields. The suit charges, among other things, that federal health and safety agencies should be held accountable for their failure to protect the public, and accuses the FCC of ignoring important studies on RF-radiation hazards, as well as overstepping its statutory authority in banning RF regulation at the local level.

But the issue may not be settled any time soon, despite a likely court ruling in the fall of 1998, widespread dissatisfaction at the local level, and increasing pressure on elected officials. The telecommunications industry, having poured millions of dollars into campaign contributions to both parties, has enormous influence. The scientific community is divided regarding safety, and the science itself--bioelectromagnetics--is arcane and complex.

What is it about cellular towers that makes people react so negatively? Is it just their intergalactic look? Or are the health concerns real? And why did the telecommunications industry fight so hard behind the scenes to disempower planning and zoning commissions? The answers go back decades, to the very heart of twentieth-century technology.

Simply put, many people love wireless convenience. There are an estimated 57 million cell-phone users in America alone. But no one loves the towers or antenna arrays that accompany the technology. The industry response to this dichotomy has been to create "stealth designs" for some installations, making them look like surrealistic pine trees, hiding antennas in church steeples, on barn silos and water towers, or designing large panels that attach to the exteriors of buildings.

But critics say aesthetics are a smoke screen obscuring the heart of the issue, which is medical. Concern about the safety of this part of the electromagnetic spectrum spans decades, fueling both government and industry research, although nowhere near enough, or of an appropriate kind. Nevertheless, that research has turned up disturbing results, and an abundance of controversy.

Radiation is a natural part of the universe. The electromagnetic spectrum is divided into ionizing and nonionizing radiation, with the former consisting of very short wavelengths, like X-rays and ultraviolet light, which have enough power to knock electrons off their orbits. These bands have the ability to do permanent damage at the cellular level, causing cancers and genetic mutations. Nonionizing radiation--emitted by powerlines, radios, TVs, cellular phones, microwave ovens, and many other sources--consists of longer wavelengths that can have less power, and has mistakenly been assumed to be harmless, apart from its ability to heat tissue. We have encircled the earth and infused the atmosphere with these nonionizing bands in ways that don't exist in nature-using abnormal exposure strengths and unusual characteristics such as alternating current, digital signaling, modulation, and odd wave forms--all without

understanding the full bioeffects.

It has been known for decades that the human anatomy is resonant with--or acts as a perfect antenna for--FM radio frequencies, and that our bodies reach peak absorption in the ultra-high frequency (UHF) ranges, right where television and cellular-phone transmissions occur. The FCC standards for radio-frequency emissions are based on thermal effects, or the RFs' ability to heat tissue, in the same way a microwave oven cooks food. But the case for *non*thermal hazards from RFs is substantial. Decades of research have found alarming effects: numerous cancers, immune system suppression, and birth defects, among others. Some research has found detrimental effects based on frequency alone, not on power density. And bioelectromagnetics researchers often note puzzling "nonlinear effects," which indicate that the most profound bioreactions occur at the lowest exposures. This body of research argues for fewer towers.

In 1992, Cletus Kanavy, chief of the Biological Effects Laboratory at the Kirkland Air Force Base in New Mexico, published a paper on RFs, stating that the information on nonthermal effects produced at levels below today's standards should not be ignored. Kanavy noted, "The principal...biological effects of greatest concern are behavioral aberrations, neural network perturbations, fetal tissue damage (inducing birth defects), cataractogenesis, altered blood chemistry, metabolic changes and suppression of the endocrine and immune systems..." Kirkland set an exposure standard 100 times more stringent than what the FCC uses for civilian exposures. The Johns Hopkins Applied Physics Laboratory did the same for its lab researchers.

Despite these findings, few appropriate RF studies, simulating long-term, low-level exposures, exist. Extrapolations from other scientific disciplines, as well as occupational and epidemiology reports, are therefore all we have to help us understand the consequences of this technology. Consumers point out that those who use the cell-phone handsets are engaging in voluntary exposures, even though handset safety also remains unresolved, according to the FDA and many industry insiders. But those who live near the towers are being forced into involuntary exposures, often after incurring great legal expenses in trying to stop the installations.

Municipal Agents often feel their hands are tied, but this may change as communities decide to draw the line. Some communities are talking about outright civil disobedience: "What are they going to do, send out the national guard and *make* us site towers?" said Richard Chevalier of Wellfleet, Massachusetts, a small New England town on Cape Cod where a church wants to site several antennas in its steeple, right in the heart of the compact historic district where centuries-old houses stand within a few feet of each other.

Other activists, such as Kati Winchell of Lincoln, Massachusetts, and Virginia

Hines of nearby Concord, in conjunction with the Lincoln-based Alliance for Democracy and the Program on Corporations, Law and Democracy, are forming a national coalition to challenge Section 704 and put this technology on hold until it is proven safe.

Dale and Janet Newton of Marshfield, Vermont, found out that a neighbor intended to lease land to a telecommunications company for a tower that would abut their maple sugar farm. They would be living and working near it 24 hours a day. The Newtons have since founded the Thistle Hill Alliance and taken out full-page ads in newspapers, prompting their legislators to restore the local rights taken away by Section 704. They have also set up a comprehensive website for RF issues.

The Newtons are among others paying serious attention in Vermont. In fact, Vermont seems poised for a rebellion that could have reverberations on the national level. That is what prompted the new chairman of the FCC, William Kennard, former chief counsel for the National Association of Broadcasters, to travel to Vermont for a mini-summit this year. (During that visit, Kennard said the FCC is "not in the zoning business," but he continued to reserve the right to pre-empt local laws nevertheless.) It was also U.S. Senator Patrick Leahy (D., VT) who wrote Senate Bill 1350 to reverse Section 704. The bill has temporarily been withdrawn, partly to protect it from being buried in the business-friendly Senate Commerce Committee. There is also a companion bill, H.R.3016, introduced by Bernard Sanders (I., VT), that is presently stuck in the Commerce Committee of the House of Representatives and may not see the light of day without significant voter pressure.

Last year, over 50 scientists and public-health officials in the Boston area, at the prompting of activist Susan Clark of Concord, signed a petition that was sent to the EPA, calling for a halt of the personal communications system (PCS) buildout in that city until further research is done. (The petition has gone unanswered.) Scientists and public-health officials in other areas are also calling for new research and caution before this wireless network expands. Even the industry researchers for the Wireless Technology Research group, the scientific arm of the Cellular Telecommunications Industry Association, went on strike for a year demanding that the industry indemnify them for the results of their research. Fifteen years earlier, the scientists on the committee responsible for writing the safety standards in effect today did the same.

Meanwhile, citizens report that the most vexing experience at the local level has been the silencing of their health concerns. Many municipal agents incorrectly interpret Section 704, assuming that since they cannot factor health into their final decisions, they therefore cannot broach the subject at all. Michael Petersen, of Lopez Island, one of the scenic San Juan Islands dotting the coast of Seattle, Washington, was ruled out of order on numerous occasions when he tried to introduce such information at public hearings over the sitingof a multi-island tower grid. So afraid of lawsuits were San Juan Island municipal agents that they wouldn't address the subject with him on the phone.

Sometimes, zoning regulations sidestep the issue by specifying that they are *not* taking health into consideration--an odd twist of logic since the purpose of zoning regulations in most state statutes is to protect the health, safety, well-being, and property values of a community.

When industry engineers show up to present applications for installations, they liken their technology to remote-control devices, such as garage-door openers or TV remote controls. They say that the power density 100 feet from antennas is equivalent to that of these familiar devices, pointing out that power density decreases rapidly with distance from an antenna. But density is only one factor of radio-wave propagation among several variables that determine safety.

Industry representatives also point out that the RF emissions of cellular towers are far below the federal standards, which they often are. They liken the power output of the technology to 100- and even 25-watt light bulbs, hoping to assuage people's fears with familiar comparisons. What they leave out is that 100 watts is the power output *per channel*, and one antenna may host dozens of channels. As user demand increases, channels can be split. Plus, unlike 60-hertz light bulbs, these installations function in the microwave, UHF bands, where questions about safety go back to the 1940s and remain unanswered today.

Clearly, the situation is not as simple as the telecommunications industry would have us believe. Yet they continue to push at the federal level for pre-emption of local rights. Their more recent requests to the FCC include; declaring even temporary moratoriums illegal; disallowing communities from making companies prove they are in compliance with FCC regulations; and forbidding discussion of the health effects at local zoning hearings. They have also petitioned the U.S. Senate Commerce Committee, headed by Senator John McCain (R., AZ), to grant their services interstate commerce status--another way of overriding local control.

This industry sees a victory at the federal level as a victory in all 50 states. The last thing they want is to meet Everytown U.S.A., where the hard questions are being asked by those assuming the risks. Efforts should be made to rein in this industry until appropriate federal research is done--studies of long-term, low-level, nonthermal exposures like those encountered by people who live near such installations. Legislation that returns control to municipalities needs support. Zoning officials must be encouraged to keep installations away from people. This is not, and never was, just about the ugliness of towers.



B. Blake Levitt is a medical and science journalist, a former New York Times writer, and author of Electromagnetic Fields: A Consumer's Guide to the Issues and How to Protect Ourselves (Harcourt Brace, 1995), for which she won an award from the American Medical Writers Association.

This essay was originally published in the Autumn 1998 issue of <u>Orion Afield</u>. To order a copy of this issue, please visit <u>The Orion Society Marketplace</u>, call (413) 528-4422, write <u>The Orion Society</u>, 195 Main Street, Great Barrington, MA 01230, or e-mail us at <u>orion@orionsociety.org</u>.

Arts and Activism | Arts and Education | Literary Arts | Visual Arts | Interviews and Conversations | About EnviroArts | EnviroArts Home

Copyright © 1991-2000 The EnviroLink Network, All Rights Reserved.



Login (http://client.prod.iaff.org/Auth/Index?

ReturnUrl=%2Fhs%2Fresi%2Fcelltowerfinal.htm) | Contact Us Programs & Services (http://client.prod.iaff.org/#page=ProgramsAndServices)

IAFF Store (http://www.iaffonlinestore.com/)

Health, Safey bordie (https://member.laff.org/pvprod/idonate/ifund.aspx?swCh=f&bBO=PA&AcctGrp=W_FND)



INTERNATIONAL ASSOCIATION OF FIRE FIGHTERS

DIVISION OF OCCUPATIONAL HEALTH, SAFETY AND MEDICINE

Position on the Health Effects from Radio Frequency/Microwave (RF/MW) Radiation in Fire Department Facilities from Base Stations for Antennas and Towers for the Conduction of Cell Phone Transmissions

The International Association of Fire Fighters' position on locating cell towers commercial wireless infrastructure on fire department facilities, as adopted by its membership in August 2004 (1), is that the IAFF oppose the use of fire stations as base stations for towers and/or antennas for the conduction of cell phone transmissions until a study with the highest scientific merit and integrity on health effects of exposure to low-intensity RF/MW radiation is conducted and it is proven that such sitings are not hazardous to the health of our members.

Further, the IAFF is investigating funding for a U.S. and Canadian study that would characterize exposures from RF/MW radiation in fire houses with and without cellular antennae, and examine the health status of the fire fighters as a function of their assignment in exposed or unexposed fire houses. Specifically, there is concern for the effects of radio frequency radiation on the central nervous system (CNS) and the immune system, as well as other metabolic effects observed in preliminary studies.

It is the belief of some international governments and regulatory bodies and of the wireless telecommunications industry that no consistent increases in health risk exist from exposure to RF/MW radiation unless the intensity of the radiation is sufficient to heat body tissue. However, it is important to note that these positions are based on non-continuous exposures to the general public to low intensity RF/MW radiation emitted from wireless telecommunications base stations. Furthermore, most studies that are the basis of this position are at least five years old and generally look at the safety of the phone itself. IAFF members are concerned about the effects of living directly under these antenna base stations for a considerable stationary period of time and on a daily basis. There are established biological effects from exposure to low-level RF/MW radiation. Such biological effects are recognized as markers of adverse health effects when they arise from exposure to toxic chemicals for example. The IAFF's efforts will attempt to establish whether there is a correlation between such biological effects and a health risk to fire fighters and emergency medical personnel due to the siting of cell phone antennas and base stations at fire stations and facilities where they work.

Critical questions concerning the health effects and safety of RF/MW radiation remain. Accordingly, should we allow exposure of our fire fighters and emergency medical personnel to this radiation to continue for the next twenty years when there is ongoing controversy over many aspects of RF/MW health effects? While no one disagrees that serious health hazards occur when living cells in the body are heated, as happens with high intensity RF/MW exposure (just like in a microwave oven), scientists are currently investigating the health hazards of low intensity RF/MW exposure. Low intensity RF/MW exposure is exposure which does not raise the temperature of the living cells in the body.

Additionally, a National Institute of Environmental Health Sciences panel designated power frequency electromagnetic fields (ELF/EMF) as "possible human carcinogens." (2) In March 2002 The International Association on Research on Cancer of the World Health Organization also assigned this designation to ELF/EMF in Volume 80 of its //ARC Monographs on the Evaluation of Carcinogenic Risks to Humans. (3)

Fixed antennas used for wireless telecommunications are referred to as cellular base stations, cell stations, PCS ("Personal Communications Service") stations or telephone transmission towers. These base stations consist of antennas and electronic equipment. Because the antennas need to be high in the air, they are often located on towers, poles, water tanks, or rooftops. Typical heights for freestanding base station towers are 50-200 feet

Some base stations use antennas that look like poles, 10 to 15 feet in length, that are referred to as "omni-directional" antennas. These types of antennas are usually found in rural areas. In urban and suburban areas, wireless providers now more commonly use panel or sector antennas for their base stations. These antennas consist of rectangular panels, about 1 by 4 feet in dimension. The antennas are usually arranged in three groups of three antennas each. One antenna in each group is used to transmit signals to wireless phones, and the other two antennas in each group are used to receive signals from wireless phones.

At any base station site, the amount of RF/MW radiation produced depends on the number of radio channels (transmitters) per antenna and the power of each transmitter. Typically, 21 channels per antenna sector are available. For a typical cell site using sector antennas, each of the three transmitting antennas could be connected to up to 21 transmitters for a total of 63 transmitters. When omni-directional antennas are used, a cellular base station could theoretically use up to 96 transmitters. Base stations used for PCS communications generally require fewer transmitters than those used for cellular radio transmissions, since PCS carriers usually have a higher density of base station antenna sites

The electromagnetic RF/MW radiation transmitted from base station antennas travel toward the horizon in relatively narrow paths. The individual pattern for a single array of sector antennas is wedge-shaped, like a piece of pie. Cellular and PCS base stations in the United States are required to comply with limits for exposure recommended by expert organizations and endorsed by government agencies responsible for health and safety. When cellular and PCS antennas are mounted on rooftops, RF/MW radiation levels on that roof or on others near by would be greater than those typically encountered on the ground.

The telecommunications industry claims cellular antennas are safe because the RF/MW radiation they produce is too weak to cause heating, i.e., a "thermal effect." They point to "safety standards" from groups such as ANSI/IEEE or ICNIRP to support their claims. But these groups have explicitly stated that their claims of "safe RF/MW radiation exposure is harmless" rest on the fact that it is too weak to produce a rise in body temperature, a "thermal effect.". (4)

There is a large body of internationally accepted scientific evidence which points to the existence of non-thermal effects of RF/MW radiation. The issue at the present time is not whether such evidence exists, but rather what weight to give it.

Internationally acknowledged experts in the field of RF/MW radiation research have shown that RF/MW transmissions of the type used in digital cellular antennas and phones can have critical effects on cell cultures, animals, and people in laboratories and have also found epidemiological evidence (studies of communities, not in the laboratory) of serious health effects at "non-thermal levels," where the intensity of the RF/MW radiation was too low to cause heating. They have found:

- Increased cell growth of brain cancer cells (5)
- A doubling of the rate of lymphoma in mice (6)
- Changes in tumor growth in rats (7)
- An increased number of tumors in rats (8)
- Increased single- and double-strand breaks in DNA, our genetic material (9)
- 2 to 4 times as many cancers in Polish soldiers exposed to RF (10)
- More childhood leukemia in children exposed to RF ⁽¹¹⁾
- Changes in sleep patterns and REM type sleep (12)
- Headaches caused by RF/MW radiation exposure (13)
- Neurologic changes (14) including:
 - O Changes in the blood-brain-barrier (15)

- Changes in cellular morphology (including cell death) (16)
- Changes in neural electrophysiology (EEG) (17)
- Changes in neurotransmitters (which affect motivation and pain perception) (18)
- Metabolic changes (of calcium ions, for instance) (19)
- Cytogenetic effects (which can affect cancer, Alzheimer's, neurodegenerative diseases) (29)
- Decreased memory, attention, and slower reaction time in school children (21)
- Retarded learning in rats indicating a deficit in spatial "working memory" (22)
- Increased blood pressure in healthy men (23)
- Damage to eye cells when combined with commonly used glaucoma medications (24)

Many national and international organizations have recognized the need to define the true risk of low intensity, non-thermal RF/MW radiation exposure, calling for intensive scientific investigation to answer the open questions. These include:

- The World Health Organization, noting reports of "cancer, reduced fertility, memory loss, and adverse changes in the behavior and development of children." (25)
- The U. S. Food and Drug Administration (FDA) (26)
- The International Agency for Research on Cancer (IARC) (27)
- The Swedish Work Environmental Fund (28)
- The National Cancer Institute (NCI) (29)
- The European Commission (EC) (30)
- New Zealand's Ministry of Health (31)
- National Health and Medical Research Council of Australia (32)
- Commonwealth Scientific Industrial Research Organization of Australia (CSIRO) (33)
- The Royal Society of Canada expert group report prepared for Health Canada (34)
- European Union's REFLEX Project (Risk Evaluation of Potential Environmental Hazards from Low Frequency Electromagnetic Field Exposure Using Sensitive in vitro Methods) (35)
- The Independent Group on Electromagnetic Fields of the Swedish Radiation Protection Board (SSI) (36)
- The United Kingdom's National Radiological Protection Board (NRPB) (37)
- The EMF-Team Finland's Helsinki Appeal 2005 (38)

Non-thermal effects are recognized by experts on RF/MW radiation and health to be potential health hazards. Safe levels of RF/MW exposure for these low intensity, non-thermal effects have not yet been established

The FDA has explicitly rejected claims that cellular phones are "safe." (39)

The Environmental Protection Agency (EPA) has stated repeatedly that the current (ANSI/IEEE) RF/MW safety standards protect only against thermal effects. (40)

Many scientists and physicians question the safety of exposure to RF/MW radiation. The CSIRO study, for example, notes that there are no clear cutoff levels at which low intensity RF/MW exposure has no effect, and that the results of ongoing studies will take years to analyze. (41)

Internationally, researchers and physicians have issued statements that biological effects from low-intensity RF/MW radiation exposure are scientifically established:

- The 1998 Vienna-EMF Resolution (42)
- The 2000 Salzburg Resolution on Mobile Telecommunication Base Stations (43)
- The 2002 Catania Resolution
- The 2004 Report of the European Union's REFLEX Project (Risk Evaluation of Potential Environmental Hazards from Low Frequency Electromagnetic Field Exposure Using Sensitive in vitro Methods) (46)
- The 2004 Second Annual Report from Sweden's Radiation Protection Board (SSI) Independent Expert Group on Electromagnetic Fields Recent Research on Mobile Telephony and
- Mobile Phones and Health 2004: Report by the Board of NRPB (The UK's National Radiological Protection Board) (48)

The county of Palm Beach, Florida, the City of Los Angeles, California, and the country of New Zealand have all prohibited cell phone base stations and antennas near schools due to safety concerns. The British Columbia Confederation of Parent Advisory Councils [BCCPAC] passed a resolution in 2003 banning cellular antennae from schools and school grounds. This organization is comparable to the Parent Teachers Association (PTA) in the United States. The resolution was directed to B.C. Ministry of Education, B.C. Ministry of Children and Family Development, B.C. School Trustees Association, and B.C. Association of Municipalities.

US Government Information

In the United States, the Federal Communications Commission (FCC) has used safety guidelines for RF/MW radiation environmental exposure since 1985.

The FCC guidelines for human exposure to RF/MW radiation are derived from the recommendations of two organizations, the National Council on Radiation Protection and Measurements (NCRP) and the Institute of Electrical and Electronics Engineers (IEEE). In both cases, the recommendations were developed by scientific and engineering experts drawn from industry, government, and academia after extensive reviews of the scientific literature related to the biological effects of RF/MW radiation.

Many countries in Europe and elsewhere use exposure guidelines developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). The ICNIRP safety limits are generally similar to those of the NCRP and IEEE, with a few exceptions. For example, ICNIRP recommends different exposure levels in the lower and upper frequency ranges and for localized exposure from certain products such as hand-held wireless telephones. Currently, the World Health Organization is working to provide a framework for international harmonization of RF/MW radiation safety standards

In order to affirm conformity to standards regarding heating of tissue, measurements are time averaged over 0.1 hours [6 minutes]. This method eliminates any spikes in the readings. Computer power bars have surge protectors to prevent damage to computers. Fire fighters and emergency medical personnel do not!

The NCRP, IEEE, and ICNIRP all have identified a whole-body Specific Absorption Rate (SAR) value of 4 watts per kilogram (4 W/kg) as a threshold level of exposure at which harmful biological thermal effects due to tissue heating may occur. Exposure guidelines in terms of field strength, power density and localized SAR were then derived from this threshold value. In addition, the NCRP, IEEE, and ICNIRP guidelines vary depending on the frequency of the RF/MW radiation exposure. This is due to the finding that whole-body human absorption of RF/MW radiation varies with the frequency of the RF signal. The most restrictive limits on whole-body exposure are in the frequency range of 30-300 MHz where the human body absorbs RF/MW energy most efficiently. For products that only expose part of the body, such as wireless phones, exposure limits in terms of SAR only are specified.

Similarly, the exposure limits used by the FCC are expressed in terms of SAR, electric and magnetic field strength, and power density for transmitters operating at frequencies from 300 kHz to

100 GHz. The specific values can be found in two FCC bulletins, OET Bulletins 56 and 65.

OET Bulletin 56, "Questions and Answers about Biological Effects and Potential Hazards of Radiofrequency Electromagnetic Fields" was designed to provide factual information to the public by answering some of the most commonly asked questions. It includes the latest information on FCC guidelines for human exposure to RF/MW radiation. Further information and a downloadable version of Bulletin 56 can be found at: http://new.iaff.org/HS/PDF/FCC%20Bulletin%2056%20-%20EMF.pdf (http://new.iaff.org/HS/PDF/FCC%20Bulletin%2056%20-%20EMF.pdf)

OET Bulletin 65, "Evaluating Compliance With FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields" was prepared to provide assistance in determining whether proposed or existing transmitting facilities, operations or devices comply with limits for human exposure to RF/MW radiation adopted by the Federal Communications Commission (FCC). Further information and a downloadable version of Bulletin 65 can be found at: http://new.iaff.org/HS/PDF/FCC%20Bulletin%2065%20-%20Cell%20Towers.pdf (MLD://new.ian.org/mb/PDr/FCC%zobulietin%z005%z0-%z0Ceil%z0Towers.pdf)

The FCC authorizes and licenses products, transmitters, and facilities that generate RF and microwave radiation. It has jurisdiction over all transmitting services in the U.S. except those specifically operated by the Federal Government. Under the National Environmental Policy Act of 1969 (NEPA), the FCC has certain responsibilities to consider whether its actions will significantly affect the quality of the human environment. Therefore, FCC approval and licensing of transmitters and facilities must be evaluated for significant impact on the environment. Human exposure to RF radiation emitted by FCC-regulated transmitters is one of several factors that must be considered in such environmental evaluations. In 1996, the FCC revised its guidelines for RF/MW radiation exposure as a result of a multi-year proceeding and as required by the Telecommunications Act of 1996.

For further information and answers to questions about the safety of RF/MW radiation from transmitters and facilities regulated by the FCC go to http://www.fcc.gov/oet/rfsafety/rf-faqs.html (http://www.fcc.gov/oet/rfsafety/rf-faqs.html).

Canadian Government Information

Industry Canada is the organization that sets regulatory requirements for electromagnetic spectrum management and radio equipment in Canada. Industry Canada establishes standards for equipment certification and, as part of these standards, developed RSS-102, which specifies permissible radiofrequency RF/MW radiation levels. For this purpose, Industry Canada adopted the limits outlined in Health Canada's Safety-Code 6, which is a guideline document for limiting RF exposure. A downloadable version of "RSS-102 - Evaluation Procedure for Mobile and Portable Radio Transmitters with respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields", as well as additional information can be found at: http://new.iaff.org/HS/PDF/Safety%20Code%206.pdf (http://new.iaff.org/HS/PDF/Safety%20Code%206.pdf)

Safety Code 6 specifies the requirements for the use of radiation emitting devices. This Code replaces the previous Safety Code 6 - EHD-TR-160. A downloadable version of "Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz TO 300 GHz – Safety Code 6", as well as further detailed information can be found at . (../PDF/Non-Ionizing%20Radiation%20Volume%2080.pdf) http://new.iaff.org/HS/PDF/Non-Ionizing%20Radiation%20Volume%2080.pdf (../PDF/Non-Ionizing%20Radiation%20Volume%2080.pdf)

US and Canadian Legal Issues

Although some local and state governments have enacted rules and regulations about human exposure to RF/MW radiation in the past, the Telecommunications Act of 1996 requires the United States Federal Government to control human exposure to RF/MW radiation. In particular, Section 704 of the Act states that, "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." Further information on federal authority and FCC policy is available in a fact sheet from the FCC's Wireless Telecommunications Bureau at www.fcc.gov/wtb (http://www.fcc.gov/wtb).

In a recent opinion filed by Senior Circuit Judge Stephen F. Williams, No. 03-1336 EMR Network v. Federal Communications Commission and United States of America, the Court upheld the FCC's decision not to initiate an inquiry on the need to revise its regulations to address non-thermal effects of radiofrequency (RF) radiation from the facilities and products subject to FCC regulation as EMR Network had requested in its September 2001 Petition for Inquiry.

At the request of the EMR Network, the EMR Policy Institute provided legal and research support for this appeal. On January 13, 2005, a Petition for Rehearing en banc by the full panel of judges at the DC Circuit Court of Appeals was filed. Briefs, background documents and the DC Circuit decision are found at: http://www.emrpolicy.org/litigation/case_law/index.htm (http://www.emrpolicy.org/litigation/case_law/index.htm).

The Toronto Medical Officer of Health for the Toronto Board of Health recommended to Health Canada that public exposure limits for RF/MW radiation be made 100 times stricter; however the recommendation was not allowed, since, as in the US, only the Canadian federal government can regulate RF/MW radiation exposure level.

World Health Organization Efforts

in 1996, the World Health Organization (WHO) established the International EMF Project to review the scientific literature and work towards resolution of health concerns over the use of RF/MW technology. WHO maintains a Web site that provides addition information on this project and about RF/MW blological effects and research. For further information go to http://www.who.int/pehemf/en/ (http://www.who.int/peh-emf/en/).

Conclusion

For decades, the International Association of Fire Fighters has been directly involved in protecting and promoting the health and safety of our membership. However, we simply don't know at this time what the possible health consequences of long-term-exposure to low-intensity RF/MW radiation of the type used by the cell phone base stations and antennas will be. No one knows—the data just aren't there. The chairman of the International Commission on Non-Ionizing Radiation Protection ICNIRP), one of the leading international organizations which formulated the page of the RF/MW radiation exposure guidelines, has stated that the guidelines include "no consideration regarding prudent avoidance" for health effects for which evidence is less than conclusive

Again, fire department facilities, where fire fighters and emergency response personnel live and work are not the proper place for a technology which could endanger their health and safety

The only reasonable and responsible course is to conduct a study of the highest scientific merit and integrity on the RF/MW radiation health effects to our membership and, in the interim, oppose the use of fire stations as base stations for towers and/or antennas for the conduction of cell phone transmissions until it is proven that such sitings are not hazardous to the health of our members.

Footnotes

[back] 1. Revised and Amended IAFF Resolution No. 15; August 2004

Study of Firefighters Exposed to Radio Frequency (RF) Radiation from Cell Towers/Masts

WHEREAS, fire stations across the United States and Canada are being sought by wireless companies as base stations for the antennas and towers for the conduction of cell phone transmissions; and

WHEREAS, many firefighters who are living with cell towers on or adjacent to their stations are paying a substantial price in terms of physical and mental health. As first responders and protectors of the general public, it is crucial that firefighters are functioning at optimal cognitive and physical capacity at all times; and

WHEREAS, the brain is the first organ to be affected by RF radiation and symptoms manifest in a multitude of neurological conditions including migraine headaches, extreme fatigue, disorientation, slowed reaction time, vertigo, vital memory loss and attention deficit amidst life threatening emergencies; and

WHEREAS, most of the firefighters who are experiencing symptoms can attribute the onset to the first week(s) these towers/antennas were activated; and

WHEREAS, RF radiation is emitted by these cellular antennas and RF radiation can penetrate every living cell, including plants, animals and humans; and

WHEREAS, both the U. S. and Canadian governments established regulatory limits for RF radiation based on thermal (heat) measurements with no regard for the adverse health effects from non-thermal radiation which is proven to harm the human brain and immune system; and

WHEREAS, the U. S. Environmental Protection Agency stated in a July 16, 2002, letter, "Federal health and safety agencies have not yet developed policies concerning possible risk from long-term, non-thermal exposures. The FCC's exposure guideline is considered protective of effects arising from a thermal mechanism (RF radiation from cell towers is non-thermal) but not from all possible mechanisms. Therefore, the generalization by many that the guidelines protecting human beings from harm by any or all mechanisms is not justified"; and

WHEREAS, an Expert Panel Report requested by the Royal Society of Canada prepared for Health Canada (1999) stated that, "Exposure to RF fields at intensities far less than levels required to produce measurable heating can cause effects in cells and tissues. These biological effects include alterations in the activity of the enzyme ornithine decarboxylase, in calcium regulation, and in the permeability of the blood-brain barrier. Some of these biological effects brought about by non-thermal exposure levels of RF could potentially be associated with adverse health effects.

WHERAS, based on concerns over growing scientific evidence of dangers from RF radiation, an international conference was convened in Salzburg, Austria, in the summer of 2000 where renowned scientists declared the upper-most RF radiation exposure limit from a tower-mast should be 1/10th of 1 microwatt (Note that 1/10th of 1 microwatt is 10,000 times lower than the uppermost limit allowed by the U. S. or Canada.); and it should be noted this limit was set because of study results showing brain wave changes at 1/10th of 1 microwatt; and

WHEREAS, in a recently cleared paper by Dr. Richard A. Albanese of the U. S. Air Force, a highly recognized physician in the area of the impact of radiation on the human body, Dr. Albanese states, "I would ask a good faith effort in achieving as low exposure rates as are possible within reasonable financial constraints. Also I would fund targeted studies using animal subjects and human groups living or working in high radiation settings or heavy cellular phone users, emphasizing disease causations. I urge acceptance of the ideal that there should be no unmonitored occupational or environmental exposures whose associated disease rates are unknown." (The opinions expressed herein are those of Dr. Albanese, and do not reflect the policies of the United States Air Force.); and

WHEREAS, recently a study, not affiliated with the wireless industry, was conducted of firefighters exposed to RF radiation from cell towers/antennas affixed to their stations.** The study

revealed brain damage that can be differentiated from chemical causation (such as inhalation of toxic smoke) suggesting RF radiation as the cause of the brain damage found on SPECT scans;

WHEREAS, firefighters are the protectors of people and property and should be protected under the Precautionary Principle of Science and therefore, unless radiation is proven safe and harmless, cellular antennas should not be placed on or near fire stations; therefore be it

RESOLVED, That the IAFF shall seek funding for an initial U. S. and Canadían study with the highest scientific merit and integrity, contrasting firefighters with residence in stations with towers to firefighters without similar exposure; and be it further

RESOLVED, That in accordance with the results of the study, the IAFF will establish protective policy measures with the health and safety of all firefighters as the paramount objective; and be it further.

RESOLVED, That the IAFF oppose the use of fire stations as base stations for antennas and towers for the conduction of cell phone transmissions until such installations are proven not to be hazardous to the health of our members.

**Note: A pilot study was conducted in 2004 of six California fire fighters working and sleeping in stations with towers. The study, conducted by Gunnar Heuser, M.D., PhD. of Agoura Hills, CA, focused on neurological symptoms of six fire fighters who had been working for up to five years in stations with cell towers. Those symptoms included slowed reaction time, lack of focus, lack of impulse control, severe headaches, anesthesia-like sleep, sleep deprivation, depression, and tremors. Dr. Heuser used functional brain scans - SPECT scans - to assess any changes in the brains of the six fire fighters as compared to healthy brains of men of the same age. Computerized psychological testing known as TOVA was used to study reaction time, impulse control, and

attention span. The SPECT scans revealed a pattern of abnormal change which was concentrated over a wider area than would normally be seen in brains of individuals exposed to toxic inhalation, as might be expected from fighting fires. Dr. Heuser concluded the only plausible explanation at this time would be RF radiation exposure. Additionally, the TOVA testing revealed among the six fire fighters delayed reaction time, lack of impulse control, and difficulty in maintaining mental focus.

[back] 2. An international blue ribbon panel assembled by the National Institute of Environmental Health Sciences (NIEHS) designated power frequency electromagnetic fields (EMF) as "possible human carcinogens" on June 24, 1998. The panel's decision was based largely on the results of epidemiological studies of children exposed at home and workers exposed on the job. The evaluation of the EMF literature followed procedures developed by the International Agency for Research on Cancer (IARC), based in Lyon, France. The working group's report will be the basis for the NIEHS report to Congress on the EMF Research and Public Information Dissemination program (EMF RAPID). The National Radiological Protection Board (NRPB) of the United Kingdom noted that the views of its Advisory Group on Non-Ionizing Radiation are "consistent with those of the NIEHS expert panel."

June 26, 1998 statement of the National Radiological Protection Board, sited in Microwave News, July/August 1998

[back] 3. World Health Organization; International Agency for Research on Cancer, IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; Volume 80 Non-Ionizing Radiation, Part 1: Static and Extremely Low-Frequency (ELF) Electric and Magnetic Fields; 2002; 429 pages; ISBN 92-832-1280-0; See http://monographs.iarc.fr/ENG/Monographs/vol80/volume80.pdf (http://monographs.iarc.fr/ENG/Monographs/vol80/volume80.pdf) This IARC Monograph provides the rationale for its designation of ELF/EMF as a possible human carcinogen. It states that:

A few studies on genetic effects have examined chromosomal aberrations and micronuclei in lymphocytes from workers exposed to ELF electric and magnetic fields. In these studies, confounding by genotoxic agents (tobacco, solvents) and comparability between the exposed and control groups are of concern. Thus, the studies reporting an increased frequency of chromosomal aberrations and micronuclei are difficult to interpret.

Many studies have been conducted to investigate the effects of ELF magnetic fields on various genetic end-points. Although increased DNA strand breaks have been reported in brain cells of exposed rodents, the results are inconclusive; most of the studies show no effects in mammalian cells exposed to magnetic fields alone at levels below 50 µT. However, extremely strong ELF magnetic fields have caused adverse genetic effects in some studies. In addition, several groups have reported that ELF magnetic fields enhance the effects of known DNA- and chromosome-damaging agents such as ionizing radiation.

The few animal studies on cancer-related non-genetic effects are inconclusive. Results on the effects on in-vitro cell proliferation and malignant transformation are inconsistent, but some studies suggest that ELF magnetic fields affect cell proliferation and modify cellular responses to other factors such as melatonin. An increase in apoptosis following exposure of various cell lines to ELF electric and magnetic fields has been reported in several studies with different exposure conditions. Numerous studies have investigated effects of ELF magnetic fields on cellular end-points associated with signal transduction, but the results are not consistent.

[back] 4. The International Commission on Non-Ionizing Radiation Protection (ICNIRP) statement "Health Issues Related to the Use of Hand-Heid Radiotelephones and Base Transmitters" of 1996 reads:

"Thermally mediated effects of RF fields have been studied in animals, including primates. These data suggest effects that will probably occur in humans subjected to whole body or localized heating sufficient to increase tissue temperatures by greater than 1C. They include the induction of opacities of the lens of the eye, possible effects on development and male fertility, various physiological and thermoregulatory responses to heat, and a decreased ability to perform mental tasks as body temperature increases. Similar effects have been reported in people subject to heat stress, for example while working in hot environments or by fever. The various effects are well established and form the biological basis for restricting occupational and public exposure to radiofrequency fields. In contrast, non-thermal effects are not well established and currently do not form a scientifically acceptable basis for restricting human exposure for frequencies used by hand-held radiotelephones and base stations."

International Commission on Non-Ionizing Radiation Protection, "Health Issues Related to the Use of Hand-Held Radiotelephones and Base Transmitters," Health Physics 70:587-593, 1996

The ANSI/IEEE Standard for Safety Levels of 1992 similarly states:

"An extensive review of the literature revealed once again that the most sensitive measurements of potentially harmful biological effects were based on the disruption of ongoing behavior associated with an increase of body temperature in the presence of electromagnetic fields. Because of the paucity of reliable data on chronic exposures, IEEE Subcommittee IV focused on evidence of behavioral disruption under acute exposures, even disruption of a transient and fully reversible nature."

IEEE Standards Coordinating committee 28 on Non-Ionizing Radiation Hazards: Standard for Safe Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 KHz to 300 GHz (ANSI/IEEE C95.1-1991), The Institute of Electrical and Electronics Engineers, New York, 1992.

[back] 5. Drs. Czerska, Casamento, Ning, and Davis (working for the Food and Drug Administration in 1997) using "a waveform identical to that used in digital cellular phones" at a power level within our current standards (SAR of 1.6 W/Kg, the maximum spatial peak exposure level recommended for the general population in the ANSI C95.1-1991 standard) found increases in cellular proliferation in human glioblastoma cells. This shows that "acceptable" levels of radiation cause human cancer cells to multiply faster. The authors note that "because of reported associations between cellular phone exposure and the occurrence of a brain tumor, glioblastoma, a human glioblastoma cell line was used" in their research.

E.M. Czerska, J. Casamento, J. T. Ning, and C. Davis, "Effects of Radiofrequency Electromagnetic Radiation on Cell Proliferation," [Abstract presented on February 7, 1997 at the workshop 'Physical Characteristics and Possible Biological Effects of Microwaves Applied in Wireless Communication, Rockville, MD] E. M. Czerska, J. Casamento Centers for Devices and Radiological Health, Food and Drug Administration, Rockville, Maryland 20857, USA; H. T. Ning, Indian Health Service, Rockville, Maryland 20857, USA; C. Davis, Electrical Engineering Dept., Univ. of Maryland, College Park, Maryland 20742, USA

[back] 6. Dr. Michael Repacholi (in 1997, currently the director of the International Electromagnetic Fields Project at the World Health Organization) took one hundred transgenic mice and exposed some to radiation for two 30 minute periods a day for up to 18 months. He found that the exposed mice developed lymphomas (a type of cancer) at twice the rate of the unexposed mice. While telecommunications industry spokespersons criticized the experiment for using mice with a mutation which predisposed them to cancer (transgenic) the researchers pointed out that

"some individuals inherit mutations in other genes...that predispose them to develop cancer, and these individuals may comprise a subpopulation at special risk from agents that would pose an otherwise insignificant risk of cancer."

Dr. Repacholi stated "I believe this is the first animal study showing a true non-thermal effect." He repeated the experiment in 1998 using 50 Hz fields instead of the 900 MHz pulsed radiation (the type used by cellular phones) used in the original experiment and found no cancer risk. He stated that this new data had implications for his original cellular phone study: "the control groups for both our RF and 50 Hz field studies showed no statistical differences, which lessens the possibility that the RF/MW radiation study result was a chance event or due to errors in methodology."

It is extremely important to note that Dr. Michael Repacholi was Chairman of the ICNIRP at the time its Statement on Health Issues Related to the Use of Hand-Held Radiotelephones and Base Transmitters was developed in 1996.

M. Repacholi et al., "Lymphomas in Eu-Pim1 Transgenic Mice Exposed to Pulsed 900 MHz Electromagnetic Fields," Radiation Research, 147, pp.631-640, May 1997

[back] 7. Dr. Ross Adey (Veterans Administration Hospital at Loma Linda University in 1996) found what appeared to be a protective effect in rats exposed to the type of radiation used in digital cellular phones. The rats were exposed to an SAR of 0.58-0.75 W/Kg 836 MHz pulsed radiation of the TDMA type two hours a day, four days a week for 23 months, with the signals turned on and off every 7.5 minutes, so total exposure was 4 hours a week. Interestingly this effect was not present when a non-digital, analog signal was used. Rats exposed developed cancer less often. This study shows that low power fields of the digital cellular frequency can influence cancer development. Whether they would protect or promote in our children is a question for further study.

Ross Adey of the Veterans Administration Hospital at Lorna Linda University, CA presented the results of pulsed (digital callular) radiation on June 13, 1996 at the 18th Annual Meeting of the

ыоенестготаgnetics Society in Victoria, Canada. Не presented the findings of the analog cellular phone radiation елест at the June 1997 Z™ world Congress for Electricity and Magnetism in Biology and Medicine in Biologna, Italy. Reviews can be found in Microwave News issues July/August, 1996 and March/April 1997.

In recognition of his more than three decades of "fundamental contributions to the emerging science of the biological effects of electromagnetic fields," the authors of the November 2004 Report of the European Union's REFLEX Project (Risk Evaluation of Potential Environmental Hazards From Low Frequency Electromagnetic Field Exposure Using Sensitive in vitro Methods) chose to include Dr. Adey's personal views on Electromagnetic Field Exposure research as the Foreword to that report. To view the entire report, see: REFLEX Final Report.pdf (.../PDF/REFLEX%20Final%20Report.pdf)

The following is taken from Dr. Adey's Foreword found on pages 1-3 of the REFLEX Report:

The Future of Fundamental Research in a Society Seeking Categoric Answers to Health Risks of New Technologies

In summary, we have become superstitious users of an ever-growing range of technologies, but we are now unable to escape the web that they have woven around us.

Media reporters in general are no better informed. Lacking either responsibility or accountability, they have created feeding frenzies from the tiniest snippets of information gleaned from scientific meetings or from their own inaccurate interpretation of published research. In consequence, the public has turned with pleading voices to government legislatures and bureaucracies for guidance...

We face the problem brought on by the blind leading the blind. Because of public pressure for rapid answers to very complex biological and physical issues, short-term research programs have been funded to answer specific questions about certain health risks.

In many countries, and particularly in the USA, the effects of such harassing and troublesome tactics on independent, careful fundamental research have been near tragic. Beguiled by health hazard research as the only source of funding, accomplished basic scientists have diverted from a completely new frontier in physical regulation of biological mechanisms at the atomic level. Not only have governments permitted corporate interests in the communications industry to fund this research, they have even permitted them to determine the research questions to be addressed and to select the institutions performing the research.

[back] 8. Dr. A. W. Guy reported an extensive investigation on rats chronically exposed from 2 up to 27 months of age to low-level pulsed microwaves at SARs up to 0.4 W/Kg. The exposed group was found to have a significantly higher incidence of primary cancers.

A. W. Guy, C. K. Chou, L. Kunz, L, Crowley, and J. Krupp, "Effects of Long-Term Low-Level Radiofrequency Radiation Exposure on Rats." Volume 9. Summary. Brooks Air Force Base, Texas, USAF School of Aerospace Medicine, USF-SAM-TR-85-11; 1985

[back] 9. Drs. Henry Lai and N. P. Singh of the University of Washington in Seattle have reported both single- and double-strand DNA breaks in the brains of rats exposed to radiofrequency electromagnetic radiation at an SAR of 1.2 W/Kg. DNA is the carrier of the genetic information in all living cells. Cumulated DNA strand breaks in brain cells can lead to cancer or neurodegenerative diseases.

H. Lai and N. P. Singh, "Single- and Double-Strand DNA Breaks in Rat Brain Cells After Acute Exposure to Radiofrequency Electromagnetic Radiation," International Journal of Radiation Biology, Vol 69, No. 4, 513-521, 1996

[back] 10. Dr. Stanisław Szmigielski has studied many thousands of Polish soldiers. He has found that those exposed to radiofrequency and microwave radiation in the workplace had more than double the cancer rate of the unexposed servicemen analyzing data from 1971-1985. He has presented further data suggesting a dose-response relationship with soldiers exposed to 100-200 W/cm² suffering 1.69 times as many cancers as the unexposed, and those exposed to 600-1000 W/cm² suffering 4.63 times as many cancers. The level considered safe for the public according to FCC regulations is 1000 W/cm². Occupational exposure up to 5000 W/cm² is allowed.

S. Szmigielski, "Cancer Morbidity in Subjects Occupationally Exposed to High Frequency (Radiofrequency and Microwave) Electromagnetic Radiation," The Science of the Total Environment 180:9-17, 1996

[back] 11. Dr. Bruce Hocking found an association between increased childhood leukemia incidence and mortality in the proximity of television towers. The power density ranged from 0.2-8.0 W/cm² nearer and 0.02 W/cm² farther from the towers.

B. Hocking, I. R. Gordon, H. L. Grain, and G. E. Hatfield, "Cancer Incidence and Mortality and Proximity to TV Towers," Medical Journal of Australia 165: 601-605; 1996

[back] 12. Drs. Mann and Röschke investigated the influence of pulsed high-frequency RF/MW radiation of digital mobile radio telephones on sleep in healthy humans. They found a hypnotic effect with shortening of sleep onset latency and a REM (Rapid Eye Movement) suppressive effect with reduction of duration and percentage of REM sleep. "REM sleep plays a special physiological role for information processing in the brain, especially concerning consolidation of new experiences. Thus the effects observed possibly could be associated with alterations of memory and learning functions."

K. Mann and J. Röschke, "Effects of Pulsed High-Frequency Electromagnetic Fields on Human Sleep," Neuropsychobiology 33:41-47, 1996

[back] 13. Dr. Allen Frey has been researching RF/MW radiation for over 3 decades. Here is the abstract on a paper concerning headaches and cellular phone radiation. "There have been numerous recent reports of headaches occurring in association with the use of hand-held cellular telephones. Are these reported headaches real? Are they due to emissions from telephones. There is reason to believe that the answer is "yes" to both questions. There are several lines of evidence to support this conclusion. First, headaches as a consequence of exposure to low intensity microwaves were reported in the literature 30 years ago. These were observed during the course of microwave hearing research before there were cellular telephones. Second, the blood-brain barrier appears to be involved in headaches, and low intensity microwave energy exposure affects the barrier. Third, the dopamine-opiate systems of the brain appear to be involved in headaches, and low intensity electromagnetic energy exposure affects those systems. In all three lines of research, the microwave energy used was approximately the same--in frequencies, modulations, and incident energies--as those emitted by present day cellular telephones, Could the current reports of headaches be the canary in the coal mine, warning of biologically significant effects?"

A. H. Frey, "Headaches from Cellular Telephones: Are they Real and What Are the Implications?" Environmental Health Perspectives Volume 106, Number 3, pp.101-103, March 1998

[back] 14. Henry Lai's review of the literature concerning neurological effects of RF/MW radiation: Existing data indicate that RF/MW radiation of relatively low intensity can affect the nervous system. Changes in blood-brain barrier, morphology, electrophysiology, neurotransmitter functions, cellular metabolism, and calcium efficus, and genetic effects have been reported in the brain of animals after exposure to RF. These changes can lead to functional changes in the nervous system. Behavioral changes in animals after exposure to RR have been reported.

Even a temporary change in neural functions after RF/MW radiation exposure could lead to adverse consequences. For example, a transient loss of memory function or concentration could result in an accident when a person is driving. Loss of short term working memory has indeed been observed in rats after acute exposure to RF/MW radiation.

Research has also shown that the effects of RF/MW radiation on the nervous system can cumulate with repeated exposure. The important question is, after repeated exposure, will the nervous system adapt to the perturbation and when will homeostasis break down? Related to this is that various lines of evidence suggest that responses of the central nervous system to RF/MW radiation could be a stress response. Stress effects are well known to cumulate over time and involve first adaptation and then an eventual break down of homeostatic processes.

H. Lai, "Neurological Effects of Radiofrequency Electromagnetic Radiation Relating to Wireless Communication Technology," Paper presentation at the IBC-UK Conference: "Mobile Phones-Is There a Health Risk?" September 16-17, 1997, Brussels, Belgium

[back] 15. Blood-Brain-Barrier: The blood-brain-barrier (BBB) is primarily a continuous layer of cells lining the blood vessels of the brain. It is critical for regulation of the brain's activity. Lai notes that "Even though most studies indicate that changes in the BBB occurs only after exposure to RF/MW radiation of high intensities with significant increase in bissue temperature, several studies have reported increases in permeability after exposure to RF/MW radiation of relatively low intensities...Pulsed RF seems to be more potent than continuous wave RF. Pulsed RF/MW is the type used in digital cellular systems. Effects on the BBB were noted at the 0.2 W/cm² level, and even at SAR of 0.016-5 W/kg. These effects could lead to local changes in brain function.

H. Lai, Ibid

[back] 16. Cellular Morphology: RF/MW radiation induced morphological changes of the central nervous system cells and tissues have been shown to occur under relatively high intensity or prolonged exposure to the RF/MW radiation. However, there are several studies which show that repeated exposure at relatively low power intensities caused morphological changes in the central nervous system. Again here pulsed (as in digital phone use) RF/MW radiation produced more pronounced effects. Certain drugs given to nonhuman primates sensitized them, for instance allowing eye damage to occur at very low power intensities. Dr Lai notes "Changes in morphology, especially cell death, could have an important implication on health. Injury-induced cell proliferation has been hypothesized as a cause of cancer." Some of these experiments were in the range of SAR 0.53 W/kg or even 0.26 W/kg.

H. Lai. Ibid

[back] 17. Neural Electrophysiology: Changes in neuronal electrophysiology, evoked potentials, and EEG have been reported. Some effects were observed at low intensities and after repeated exposure, suggesting cumulative effect. Energy density levels were as low as 50 W/cm².

H. Lai, Ibid

[back] 18. Neurotransmitters: Neurotransmitters are molecules which transmit information from one nerve cell to another. Early studies have reported changes in various neurotransmitters (catechalamines, secretaring and applicable plants) in the brain of primate catechalamines, secretaring and applicable plants of primate catechalamines, secretaring and applicable plants of primate catechalamines, secretaring and applicable plants of primate catechalamines.

neurotransmitter functions after exposure to low intensities of RF radiation. For example, effects were seen at $50 \ \mu\text{W/cm}^2$ in one experiment. U.S. and Canadian RF/MW radiation safety policies allow exposures of $1000 \ \mu\text{W/cm}^2$ at that frequency.

RF/MW radiation activates endogenous opioids in the brain. Endogenous opioids are neurotransmitters with morphine-like properties and are involved in many important physiological and behavioral functions, such as pain perception and motivation.

The response to RF/MW radiation depends on the area of the brain studied and on the duration of exposure. Exposure to RF/MW radiation has been shown to affect the behavioral actions of benzodiazepines (these are drugs such as Valium).

H Lai Ibio

[back] 19. Metabolic Changes in Neural Tissue: Several studies investigated the effects of RF/MW radiation exposure on energy metabolism in the rat brain. Surprisingly, changes were reported after exposure to relatively low intensity RF/MW radiation for a short duration of time (minutes). The effects depended on the frequency and modulation characteristics of the RF/MW radiation and did not seem to be related to temperature changes in the tissue.

Calcium ions play important roles in the functions of the nervous system, such as the release of neurotransmitters and the actions of some neurotransmitter receptors. Thus changes in calcium ion concentration could lead to alterations in neural functions. This is an area of considerable controversy because some researchers have also reported no significant effects of RF/MW radiation exposure on calcium efflux. However, when positive effects were observed, they occurred after exposure to RF/MW radiation of relatively low intensities and were dependent on the modulation and intensity of the RF/MW radiation studied (window effects). Some studies had SARs as low as 0.05-0.005 W/Kg.

H. Lai, Ibid

[back] 20. Cytogenetic effects have been reported in various types of cells after exposure to RF/MW radiation. Recently, several studies have reported cytogenetic changes in brain cells by RF/MW radiation, and these results could have important implication for the health effects of RF/MW radiation. Genetic damage to glial cells can result in carcinogenesis. However, since neurons do not undergo mitosis, a more likely consequence of neuronal genetic damage is changes in functions and cell death, which could either lead to or accelerate the development of neurodegenerative diseases. Power densities of 1 mW/cm² were employed, a level considered safe for the public by the FCC.

RF/MW radiation -induced increases in single and double strand DNA breaks in rats can be blocked by treating the rats with melatonin or the spin-trap compound N-t-butyl--phenylnitrone. Since both compounds are potent free radical scavengers, these data suggest that free radicals may play a role in the genetic effect of RF. If free radicals are involved in the RF-induced DNA strand breaks in brain cells, results from this study could have an important implication on the health effects of RF exposure. Involvement of free radicals in human diseases, such as cancer and atherosclerosis, has been suggested. Free radicals also play an important role in the aging process, which has been ascribed to be a consequence of accumulated oxidative damage to body tissues, and involvement of free radicals in neurodegenerative diseases, such as Alzheimer's, Huntington, and Parkinson, has also been suggested. One can also speculate that some individuals may be more susceptible to the effects of RF/MW radiation exposure.

H. Lai, Ibid

[back] 21. Dr. A. A. Kolodynski and V. V. Kolodynska of the Institute of Biology, Latvian Academy of Sciences, presented the results of experiments on school children living in the area of the Skrunda Radio Location Station in Latvia. Motor function, memory, and attention significantly differed between the exposed and control groups. The children living in front of the station had less developed memory and attention and their reaction time was slower.

A. A. Kolodynski, V. V. Kolodynska, "Motor and Psychological Functions of School Children Living in the Area of the Skrunda Radio Location Station in Latvia," The Science of the Total Environment 180:87-93, 1996

[back] 22. Dr. H. Lai and colleagues in 1993 exposed rats to 45 minutes of pulsed high frequency RF/MW radiation at low intensity and found that the rats showed retarded learning, indicating a deficit in spatial "working memory" function.

H Lai, A. Horita, and A. W. Guy, "Microwave Irradiation Affects Radial-Arm Maze Performance in the Rat," Bioelectromagnetics 15:95-104, 1994

NOTE: Dr. Lai's January 2005 compilation of published RF/MW radiation studies demonstrating biological effects of exposure to low-intensity RF/MW radiation is included as a Reference section at the end of this report.

[back] 23. Dr. Stefan Braune reported a 5-10 mm Hg resting blood pressure rise during exposure to RF/MW radiation of the sort used by cellular phones in Europe. The Lancet, the British medical journal where the report appeared, stated that "Such an increase could have adverse effects on people with high blood pressure."

S. Braune, "Resting Blood Pressure Increase During Exposure to a Radio-Frequency Electromagnetic Field," The Lancet 351, pp. 1,857-1,858, 1998

[back] 24. Dr. Kues and colleagues (of Johns Hopkins University and the Food and Drug Administration) found that placing timolol and pilocarpine into the eyes of monkeys and then exposing them to low power density pulsed RF/MW radiation caused a significant reduction in the power-density threshold for causing damage to the cells covering the eye and the iris. In fact the power was reduced by a factor of 10, so that it entered the "acceptable, safe" level of the FCC, 1 mW/cm²! Timolol and pilocarpine are commonly used by people suffering from glaucoma. This is a very important study, as it points to the fact that laboratory experiments under "ideal" conditions are rarely what one finds in real life. The "safe" level of RF/MW radiation exposure for healthy people is likely to be very different than for those of us who suffer from illness, take medications, or are perhaps simply younger or older than those in the experiments.

H. A. Kues, J. C. Monahan, S. A. D'Anna, D. S. McLeod, G. A. Lutty, and S. Koslov, "Increased Sensitivity of the Non-Human Primate Eye to Microwave Radiation Following Ophthalmic Drug Pretreatment," Bioelectromagnetics 13:379-393, 1992

[back] 25. The World Health Organization states that "concerns have been raised about the safety of cellular mobile telephones, electric power lines and police speed-control 'radar guns.' Scientific reports have suggested that exposure to electromagnetic fields emitted from these devices could have adverse health effects, such as cancer, reduced fertility, memory loss, and adverse changes in the behaviour and development of children." Therefore, "In May 1996, in response to growing public health concerns in many Member States over possible health effects from exposure to an ever-increasing number and diversity of EMF sources, the World Health Organization launched an international project to assess health and environmental effects of exposure to electric and magnetic fields, which became known as the International EMF Project. The International EMF Project will last for five years." "A number of studies at [frequencies above about 1 MHz] suggest that exposure to RF fields too weak to cause health consequences, including cancer and memory loss. Identifying and encouraging coordinated research into these open questions is one of the major objectives of the International EMF Project."

World Health Organization Fact Sheet N181, "Electromagnetic Fields and Public Health, The International EMF Project," reviewed May 1998 and World Health Organization Fact Sheet N182, "Electromagnetic Fields and Public Health, Physical Properties and Effects on Biological Systems," reviewed May 1998,

[back] 26. The U. S. Food and Drug Administration in a January 14, 1998 letter to the House Telecommunications Subcommittee stated it "believes additional research in the area of RF is needed." In 1997 the FDA established the following priorities:

- · Chronic (lifetime) animal exposures should be given the highest priority.
- Chronic animal exposures should be performed both with and without the application of chemical initiating agents to investigate turnor promotion in addition to tumorigenesis.
- Identification of potential risks should include end points other than brain cancer (e.g. ocular effects of RF radiation exposure).
- Replication of prior studies demonstrating positive biological effects work is needed. A careful replication of the Chou and Guy study (Bioelectromagnetics, 13, pp.469-496, 1992) which suggests that chronic exposure of rats to microwaves is associated with an increase in tumors, would contribute a great deal to the risk identification process for wireless communication products.
- Genetic toxicology studies should focus on single cell gel studies of DNA strand breakage and on induction of micronuclei.
- Epidemiology studies focused on approaches optimized for hazard identification are warranted.

Food and Drug Administration Recommendations quoted in Microwave News, March/April, 1997

[back] 27. The International Agency for Research on Cancer (IARC) is planning a multi-country, multi-million dollar study of cancer among users of wireless phones, beginning 1998. Microwave News, January/February, 1998

[back] 28. The Swedish Work Environmental Fund initiated a new epidemiological study on cellular phone radiation and brain tumors in 1997. Microwave News, November/December, 1997

[back] 29. The National Cancer Institute announced plans for a 5 year study of brain tumors and RF/MW radiation in 1993. Microweve News, January/February, 1993

[back] 30. The European Commission (EC) Expert Group on health effects of wireless phones called for a 5 year research program with a \$20 million budget, reported 1997. Microwave News, January/February, 1997

[back] 31. A report commissioned by New Zealand's Ministry of Health stated that "It is imperative that the scientific issues be clarified as soon as possible, as there is much at stake." It called for more research to examine the potential health effects of RF radiation. Microwave News, November/December, 1996

[back] 32. The National Health and Medical Research Council of Australia announced its sponsorship of a 5 year, \$3.5 million project on potential health effects of mobile phone technology in 1996. Microwave News, November/December, 1996

[back] 33. The Commonwealth Scientific Industrial Research Organization (CSIRO) of Australia concluded in 1995 that the safety of cellular telephones cannot be resolved "in the near future." Dr. Stan Barnett, a principal researcher of CSIRO, states that "My goal is to establish a national committee to approach this problem by coordinating relevant and focused research." He estimated a budget of \$3 million over a 3 year period would be necessary.

Commonwealth Scientific Industrial Research Organization, "Status of Research on Biological Effects and Safety of Electromagnetic Radiation: Telecommunications Frequencies," a report prepared by Dr. Stan Barnett, as sited in Microwave News, September/October, 1995

[back] 34. In Canada, Expert Panels are formed in response to requests from governments and other organizations for guidance on public policy issues where specialized knowledge is required. The Royal Society of Canada (RSC) is the only national academic organization, encompassing all fields of study in the sciences, arts and humanities that provides, through its Committee on Expert Panels, a service to Canadians by convening Expert Panels that produce publicly disseminated, arms-length, third party reviews. The most recent Expert Panel report addressing RF/MW radiation examines new data on dosimetry and exposure assessment, thermoregulation, biological effects such as enzyme induction, and toxicological effects, including genotoxicity, carcinogenicity, and testicular and reproductive outcomes. Epidemiological studies of mobile phone users and occupationally exposed populations are examined, along with human and animal studies of neurological and behavioural effects. All of the authoritative reviews completed within the last two years have supported the need for further research to clarify the possible associations between RF fields and adverse health outcomes that have appeared in some reports. See: http://www.rsc.ca/index.php?lang_id=1&page_id=120).

Recent Advances in Research on Radiofrequency Fields and Health: 2001-2003; A Follow-up to The Royal Society of Canada, Report on the Potential Health Risks of Radiofrequency Fields from Wireless Telecommunication Devices, 1999

[back] 35. The European Union effort to address this issue is in the study Risk Evaluation of Potential Environmental Hazards from Low Energy Electromagnetic Field Exposure Using Sensitive In vitro Methods (REFLEX). Exposure to electromagnetic fields (EMF) in relation to health is a controversial topic throughout the industrial world. So far epidemiological and animal studies have generated conflicting data and thus uncertainty regarding possible adverse health effects. This situation has triggered confroversies in communities especially in Europe with its high density of population and industry and the omnipresence of EMF in infrastructures and consumer products. These controversies are affecting the siting of facilities, leading people to relocate, schools to close or power lines to be re-sited, all at great expense. The European Union believes that causality between EMF exposure and disease can never be regarded as proven without knowledge and understanding of the basic mechanisms possibly triggered by EMF. To search for those basic mechanisms powerful technologies developed in toxicology and molecular biology were to be employed in the REFLEX project to investigate cellular and sub-cellular responses of living cells exposed to EMF in vitro.

The REFLEX data have made a substantial addition to the data base relating to genotoxic and phenotypic effects of both ELF-EMF and RF-EMF on in vitro cellular systems. While the data neither precludes nor confirms a health risk due to EMF exposure nor was the project designed for this purpose, the value lies in providing new data that will enable mechanisms of EMF effects

to be studied more effectively than in the past. Furthermore, the REFLEX data provide new information that will be used for risk evaluation by WHO, IARC and ICNIRP. For further information on REFLEX see: http://europa.eu.int/comm/research/quality-of-life/ka4/ka4_electromagnetic_en.html (http://europa.eu.int/comm/research/quality-of-life/ka4/ka4_electromagnetic_en.html)

[back] 36. The Swedish Radiation Protections Institute (SSI) endeavors to ensure that human beings and the environment are protected from the harmful effects of radiation, both in the present and in the future. SSI has focused on epidemiological research on cancer and exposure from mobile phones and transmitters as well as experimental cancer research. In addition three selected topics were also discussed, namely blood-brain barrier, heat shock proteins, and precautionary framework. For further information on SSI see: http://www.ssi.se/forfattning/eng_forfattlista.html)

[back] 37. In the United Kingdom, the National Radiological Protection Board (NRPB) was created by the Radiological Protection Act 1970. The statutory functions of NRPB are to advance the acquisition of knowledge about the protection of mankind from radiation hazards through research and to provide information and advice to persons (including Government Departments) with there is a need for better occupational studies rather than simply for more. In particular, the studies need to be of occupational groups for whom measurements show that there is genuinely a substantially raised exposure to RF fields. If the studies are to be more informative than those so far, a key requirement will be for improved exposure measurement (or improved estimation of exposure) for individuals, or at least for occupational groups. It would be desirable, as far as practical, that the studies should measure the intensity and timing of RF field exposures, and also that they should include some assessment of major RF field exposures from sources other than the current occupation. Ideally, exposure assessment needs to be anatomical site (organ)-specific, because some sources result in greatly differing doses to different parts of the body. It is a difficulty in these prescriptions, of course, that the appropriate exposure metric is unknown. For further information on NRPB see: http://www.hpa.org.uk/radiation/ (http://www.hpa.org.uk/radiation/)

[back] 38. On January 5, 2005, the EMF-Team Finland issued the Helsinki Appeal 2005 to members of the European Parliament. In it physicians and researchers call on the European Parliament to apply the Precautionary Principle to electromagnetic fields, especially in the radio- and microwave- frequency bands. They criticize the present RF/MW radiation safety standards that do not recognize the biological effects caused by non-thermal exposures to non-ionizing radiation [i.e., RF/MW radiation.] They also call for continued refunding of the REFLEX EMF research program. The text of the Helsinke Appeal 2005 is found at: http://www.emrpolicy.org/news/headlines/index.htm (http://www.emrpolicy.org/news/headlines/index.htm)

[back] 39. On July 19, 1993 Dr. Elizabeth Jacobson, Deputy Director for Science, Center for Devices and Radiological Health, Food and Drug Administration criticized Thomas Wheeler, President of the Cellular Telecommunications Industry Association:

"I am writing to let you know that we were concerned about two important aspects of your press conference of July 16 concerning the safety of cellular phones, and to ask that you carefully consider the following comments when you make future statements to the press. First, both the written press statements and your verbal comments during the conference seemed to display an unwarranted confidence that these products will be found absolutely safe. In fact, the unremittingly upbeat tone of the press packet strongly implies that there can be no hazard, leading the reader to wonder why any further research would be needed at all....More specifically, your press packet selectively quotes from our Talk Paper of February 4 in order to imply that FDA believes that cellular phones are "safe." ("There is no proof at this point that cellular phones are harmful.") In fact, the same Talk Paper also states, "There is not enough evidence to know for sure, either way." Our position, as we have stated it before, is this: Although there is no direct evidence linking cellular phones with harmful effects in humans, a few animal studies suggest that such effects could exist. It is simply too soon to assume that cellular phones are perfectly safe, or that they are hazardous—either assumption would be premature. This is precisely why more research is needed."

Full text of letter can be found in Microwave News, July/August, 1993

[back] 40. In 1993 the Director of the Office of Radiation and Indoor Air of the Environmental Protection Agency suggested that the FCC not adopt the 1992 ANSI/IEEE standard "due to serious flaws," among them (1) "the ANSI/IEEE conclusion that there is no scientific data indicating that certain subgroups of the population are more at risk than others is not supported by NCRP and EPA reports" and (2) "the thesis that ANSI/IEEE recommendations are protective of all mechanisms of interaction is unwarranted because the adverse effects level in the 1992 ANSI/IEEE standard are based on a thermal effect."

Letter from Margo T. Oge, Director, Office of Radiation and Indoor Air to Thomas Stanley, Chief Engineer, Office of engineering and Technology, FCC, dated Nov 9, 1993

[back] 41. A brief sampling of the CSIRO report:

Problems in studies of human populations published to date include imprecise estimates of exposure. As a result, such epidemiological studies may underestimate any real risk. The likelihood of epidemiological studies providing useful information is questionable, particularly if the biological end point cannot be predicted. Its value in the short term (less than 10 years) must be negligible unless there was an enormous increase in the rate of cancer growth. Interestingly, the incidence of brain tumors in the EC countries has increased substantially in recent years.

RF safety cannot be assessed in the absence of reported serious effects when so little research has been aimed at the problem. It is somewhat surprising, and rather disappointing, to find that although the literature contains many hundreds of publications, there are very few areas of consensus....At low levels the absence of clear thresholds and [the] presence of intensity and frequency windows have created questions rather than provided answers.

There is no doubt that the interpretation of bloeffects data has been clouded by a preoccupation with thermally mediated processes. In fact, development of the ANSI/IEEE standard is based only on well-established thermal effects, and ignores the more subtle non-thermal processes that are more difficult to interpret and apply to human health.

Commonwealth Scientific Industrial Research Organization, "Status of Research on Biological Effects and Safety of Electromagnetic Radiation: Telecommunications Frequencies," a report prepared by Dr. Stan Barnett, as sited in Microwave News, September/October, 1995

[back] 42. Statement from the October 25-28, 1998 "Symposium of Mobile Phones and Health - Workshop on Possible Biological and Health Effects of RF Electromagnetic Fields" held at the University of Vienna, Austria.

The preferred terminology to be used in public communication: Instead of using the terms "athermal", "non-thermal" or "microthermal" effects, the term "low intensity biological effects" is more

appropriate

Preamble: The participants agreed that biological effects from low-intensity exposures are scientifically established. However, the current state of scientific consensus is inadequate to derive reliable exposure standards. The existing evidence demands an increase in the research efforts on the possible health impact and on an adequate exposure and dose assessment.

Base stations: How could satisfactory Public Participation be ensured: The public should be given timely participation in the process. This should include information on technical and exposure data as well as information on the status of the health debate. Public participation in the decision (limits, siting, etc.) should be enabled.

Cellular phones: How could the situation of the users be improved: Technical data should be made available to the users to allow comparison with respect to EMF-exposure. In order to promote prudent usage, sufficient information on the health debate should be provided. This procedure should offer opportunities for the users to manage reduction in EMF-exposure. In addition, this process could stimulate further developments of low-intensity emission devices.

[back] 43. Statement from the June 7-8, 2000 International Conference on Cell Tower Siting Linking Science and Public Health, Salzburg, Austria. The full report can be found at: http://new.iaff.org/HS/PDF/cell_tower_measurements.pdf (http://new.iaff.org/HS/PDF/cell_tower_measurements.pdf)

- It is recommended that development rights for the erection and for operation of a base station should be subject to a permission procedure. The protocol should include the following aspects:
 - o Information ahead and active involvement of the local public
 - o Inspection of alternative locations for the siting
 - o Protection of health and wellbeing
 - Considerations on conservation of land- and townscape
 - Computation and measurement of exposure
 - o Considerations on existing sources of HF-EMF exposure
 - Inspection and monitoring after installation
- · It is recommended that a national database be set up on a governmental level giving details of all base stations and their emissions.
- It is recommended for existing and new base stations to exploit all technical possibilities to ensure exposure is as low as achievable (ALATA-principle) and that new base stations are planned to guarantee that the exposure at places where people spend longer periods of time is as low as possible, but within the strict public health guidelines.
- Presently the assessment of biological effects of exposures from base stations in the low-dose range is difficult but indispensable for protection of public health. There is at present evidence of no threshold for adverse health effects.
 - o Recommendations of specific exposure limits are prone to considerable uncertainties and should be considered preliminary. For the total of all high frequency irradiation a limit value of 100 mW/m² (10 µW/cm²) is recommended.
 - o For preventive public health protection a preliminary guideline level for the sum total of exposures from all ELF pulse modulated high-frequency facilities such as GSM base stations of 1 mW/m² (0.1 pW/cm²) is recommended.

[back] 44. Scientists attending the September 13-14, 2002 International Conference "State of the Research on Electromagnetic Fields — Scientific and Legal Issues," organized by ISPESL (National Institute for Prevention and Work Safety, Italy), the University of Vienna, and the City of Catania, held in Catania, Italy, agreed to the following:

- Epidemiological and in vivo and in vitro experimental evidence demonstrates the existence for electromagnetic field (EMF) induced effects, some of which can be adverse to health.
- We take exception to arguments suggesting that weak (low intensity) EMF cannot interact with tissue.
- There are plausible mechanistic explanations for EMF-induced effects which occur below present ICNIRP and IEEE guidelines and exposure recommendations by the EU.
- The weight of evidence calls for preventive strategies based on the precautionary principle. At times the precautionary principle may involve prudent avoidance and prudent use.
- We are aware that there are gaps in knowledge on biological and physical effects, and health risks related to EMF, which require additional independent research.

[back] 45. The Freiburger Appeal is a German based appeal by mainly medical practitioners who are concerned about the effects, they believe, from mobile phone technology including masts that are appearing in their patients. It started in Oct 2002 and with very little international publicity has got 50,000 signatories with at least 2000 medical signatures from across the world. Mast These physicians and scientists agreed to establish an international scientific commission to promote research for the protection of public health from EMF, and to develop the scientific basis and strategies for assessment, prevention, management and communication of risk, based on the precautionary principle.

Excerpt

On the basis of our daily experiences, we hold the current mobile communications technology (introduced in 1992 and since then globally extensive) and cordless digital telephones (DECT standard) to be among the fundamental triggers for this fatal development. One can no longer evade these pulsed microwaves. They heighten the risk of already-present chemical/physical influences, stress the body-immune system, and can bring the body-still-functioning regulatory mechanisms to a halt. Pregnant women, children, adolescents, elderly and sick people are

Statement of the physicians and researchers of Interdisciplinare Gesellschaft für Umweltmedizin e. V. (Interdisciplinary Association for Environmental Medicine) IGUMED, Sackingen, Germany, September 19, 2002. The Freiburger Appeal can be found at: http://www.mastsanity.org/doctors-appeals.html (http://www.mastsanity.org/doctors-appeals.html).

[back] 46. Report of the European Union's REFLEX Project (Risk Evaluation of Potential Environmental Hazards from Low Frequency Electromagnetic Field Exposure Using Sensitive in vitro Methods), November 2004. The Project studied ELF and RF exposures to various animal cell types. The report is found at: http://new.iaff.org/HS/PDF/REFLEX%20Final%20Report.pdf (http://new.iaff.org/HS/PDF/REFLEX%20Final%20Report.pdf)

From the Summary: (the omnipresence of EMF's in infrastructures and consumer products have become a topic of public concern. This is due to the fear of people that based on the many conflicting research data a risk to their health cannot be excluded with some certainty. Therefore, the overall objective of REFLEX was to find out whether or not the fundamental biological processes at the cellular and molecular level support such an assumption. For this purpose, possible effects of EMF's on cellular events controlling key functions, including those involved in carcinogenesis and in the pathogenesis of neurodegenerative disorders, were studied through focused research. Failure to observe the occurrence of such key critical events in living cells after EMF exposure would have suggested that further research efforts in this field could be suspended and financial resources be reallocated to the investigation of more important issues. But as clearly demonstrated, the results of the REFLEX project show the way into the opposite direction.

[back] 47. From the Discussion section of the December 20, 2004 Second Annual Report of Sweden's Radiation Protection Board (SSI) entitled: Recent Research on Mobile Telephony and Health Risks: Second Annual Report from SSI's Independent Expert Group on Electromagnetic Fields. The complete report is available at: http://new.iaff.org/HS/PDF/EMF_exp_Eng_2004.pdf (http://new.iaff.org/HS/PDF/EMF_exp_Eng_2004.pdf)

To date, little is known about the levels of radiofrequency radiation exposure in the general population from sources such as mobile phones being used by oneself or other people, mobile phone base stations, and radio and television transmitters. Measurements that have been performed have usually been made as a result of public concern about base station exposures or other specific sources, and have therefore been made at locations that could be assumed to have higher fields than would be the case if measurement locations were selected randomly. Furthermore, all measurements have been stationary, and there is today no knowledge about the level of exposure that an individual will have throughout the day.

There is need for information about the personal exposure to RF fields in the general population, to enhance the understanding of the relative importance of exposure from base stations close to the home, from radio and television transmitters, and from the use of mobile phones . . . Studies with personal RF exposure measurements of randomly selected samples of the general population are strongly encouraged.

[back] 48. Released January 11, 2005, Mobile Phones and Health 2004: Report by the Board of NRPB Documents of the NRPB: Volume 15, No. 5. See: Mobile Phones and Health 2004 (http://209.85.165.104/u/hpa?q=cache:QEbGeid448oJ:www.hpa.org.uk/radiation/publications/documents_of_nrpb/abstracts/absd15-5.htm+Mobile+Phones+and+Health+2004:+Report+by+the+Board+of+NRPB+Documents+of+the+NRPB:+Volume+15,+No.+5&hl=en&ct=clnk&cd=1&gl=us&ie=UTF-8)

From the Executive Summary:

The Board notes that a central recommendation in the Stewart Report was that a precautionary approach to the use of mobile phone technologies be adopted until much more detailed and scientifically robust information on any health effects becomes available.

The Board considers that it is important to understand the signal characteristics and field strengths arising from new telecommunications systems and related technologies, to assess the RF exposure of people, and to understand the potential biological effects on the human body.

[back] 49. The ICNIRP exposure guidelines are only designed to protect against "known adverse health impacts," according to Dr. Jürgen Bernhardt, ICNIRP's chairman. Bernhardt reviewed the updated limits, which cover the spectrum from 1 Hz to 300 GHz, in a presentation at the 20th Annual Meeting of the Bioelectromagnetics Society in St. Pete Beach, FL, on June 10. The limits protect against "short-term, immediate health effects" such as nerve stimulation, contact shocks and thermal insults, according to the guidelines, which appear in the April issue of Health Physics (74, pp. 494-522, 1998). Despite "suggestive" evidence that power frequency magnetic fields can be carcinogenic, ICNIRP has concluded that this and other non-thermal health effects have not been "established." ICNIRP has long followed this approach to standard-setting. In his talk, Bernhardt noted that the guidelines include "no consideration regarding prudent avoidance" for health effects for which evidence is less than conclusive.

Microwave News, July/August 1998

Additional References and Studies

The following references reporting biological effects of radiofrequency radiation (RFR) at low intensities through January 2005 were compiled on 12/27/04 by Henry C. Lai PhD, Research Professor of Bioengineering, University of Washington, Seattle, WA

Balode Sci Total Environ 180(1):81-85, 1996 - blood cells from cows from a farm close and in front of a radar installation showed significantly higher level of severe genetic damage.

Boscol et al. Sci Total Environ 273(1-3):1-10, 2001 - RFR from radio transmission stations (0.005 mW/cm²) affects immune system in women.

Chiang et al. J. Bioelectricity 8:127-131, 1989 - people who lived and worked near radio antennae and radar installations showed deficits in psychological and short-term memory tests.

de Pomerai et al. Nature 405:417-418, 2000. Enzyme Microbial Tech 30:73-79, 2002 - reported an increase in a molecular stress response in cells after exposure to a RFR at a SAR of 0.001

W/kg. This stress response is a basic biological process that is present in almost all animals - including humans.

de Pomerai et al. (FEBS Lett. 22:543(1-3):93-97, 2003 - RFR damages proteins at 0.015-0.020 W/kg

D'Inzeo et al. Bioelectromagnetics 9(4):363-372, 1988 - very low intensity RFR (0.002 – 0.004 mW/cm²) affects the operation of acetylcholine-related ion-channels in cells. These channels play important roles in physiological and behavioral functions.

Dolk et al. Am J Epidemiol 145(1):1-91997- a significant increase in adult leukemias was found in residents who lived near the Sutton Coldfield television (TV) and frequency modulation (FM) radio transmitter in England.

Dutta et al. Bioelectromagnetics 10(2):197-202 1989 - reported an increase in calcium efflux in cells after exposure to RFR at 0.005 W/kg. Calcium is an important component of normal cellular functions.

Fesenko et al. Bioelectrochem Bioenerg 49(1):29-35, 1999 - reported a change in immunological functions in mice after exposure to RFR at a power density of 0.001 mW/cm².

Hallberg O, Johansson O, (2004) concluded that continuous disturbance of cell repair mechanisms by body-resonant FM electromagnetic fields seems to amplify the carcinogenic effects resulting from cell damage caused e.g. by UV-radiation.

Hjollund et al. Reprod Toxicol 11(6):897, 1997 - sperm counts of Danish military personnel, who operated mobile ground-to-air missile units that use several RFR emitting radar systems (maximal mean exposure 0.01 mW/cm²), were significantly lower compared to references.

Hocking et al. Med J Aust 165(11-12):601-605, 1996 - an association was found between increased childhood leukemia incidence and mortality and proximity to TV towers.

Ivaschuk et al. Bioelectromagnetics 18(3):223-229, 1999 - short-term exposure to cellular phone RFR of very low SAR (26 mW/kg) affected a gene related to cancer.

Kolodynski and Kolodynska, Sci Total Environ 180(1):87-93, 1996 - school children who lived in front of a radio station had less developed memory and attention, their reaction time was slower, and their neuronuscular apparatus endurance was decreased.

Kwee et al. Electro- and Magnetobiology 20: 141-152, 2001 - 20 minutes of cell phone RFR exposure at 0.0021 W/kg increased stress protein in human cells.

Lebedeva et al. Crit Rev Biomed Eng 28(1-2):323-337, 2000 - brain wave activation was observed in human subjects exposed to cellular phone RFR at 0.06 mW/cm2.

Magras and Xenos Bioelectromagnetics 18(6):455-461, 1999 - reported a decrease in reproductive function in mice exposed to RFR at power densities of 0.000168 - 0.001053 mW/cm². Irreversible sterility was found in the fifth generation of offspring.

Mann et al. Neuroendocrinology 67(2):139-144, 1998 - a transient increase in blood cortisol was observed in human subjects exposed to cellular phone RFR at 0.02 mW/cm². Cortisol is a hormone involved in stress reaction.

Marinelli et al. J Cell Physiol. 198(2):324-332, 2004 - exposure to 900-MHz RFR at 0.0035 W/kg affected cell's self-defense responses.

Michelozzi et al. Epidemiology 9 (Suppl) 354p, 1998 - leukemia mortality within 3.5 km (5,863 inhabitants) near a high power radio-transmitter in a peripheral area of Rome was higher than expected.

Michelozzi et al. Am J Epidemiol 155(12):1096-1103, 2002 - childhood leukemia higher at a distance up to 6 km from a radio station.

Navakatikian and Tomashevskaya "Biological Effects of Electric and Magnetic Fields, Volume 1," D.O. Carpenter (ed) Academic Press, San Diego, CA, pp.333-342. 1994 - RFR at low intensities (0.01 - 0.1 mW/cm²; 0.0027- 0.027 W/kg) induced behavioral and endocrine changes in rats. Decreases in blood concentrations of testosterone and insulin were reported.

Novoselova et al. Bioelectrochem Bioenerg 49(1):37-41, 1999 -low intensity RFR (0.001 mW/cm²) affects functions of the immune system.

Park et al. International Archives of Occupational and Environmental Health 77(6):387-394, 2004 - higher mortality rates for all cancers and leukemia in some age groups in the area near the AM radio broadcasting towers.

Person et al. Wireless Network 3:455-461, 1997 - reported an increase in the permeability of the blood-brain barrier in mice exposed to RFR at 0.0004 - 0.008 W/kg. The blood-brain barrier envelops the brain and protects it from toxic substances.

Phillips et al. Bloelectrochem. Bioenerg. 45:103-110, 1998 - reported DNA damage in cells exposed to RFR at SAR of 0.0024 - 0.024 W/kg.

Polonga-Moraru et al. Bioelectrochemistry 56(1-2):223-225, 2002 - change in membrane of cells in the retina (eye) after exposure to RFR at 15 µW/cm².

Pyrpasopoulou et al. Bioelectromagnetics 25(3):216-227, 2004 - exposure to cell phone radiation during early gestation at SAR of 0.0005 W/kg (5 µW/cm²) affected kidney development in rats.

Salford et al. Environ Health Persp Online January 29, 2003 - Nerve cell damage in mammalian brain after exposure to microwaves from GSM mobile phones signal at 0.02 W/kg.

Santini et al. Pathol Biol (Paris) 50(6):369-373, 2002 - increase in complaint frequencies for tiredness, headache, sleep disturbance, discomfort, irritability, depression, loss of memory, dizziness, libido decrease, in people who lived within 300 m of mobile phone base stations.

Sarimov et al. IEEE Trans Plasma Sci 32:1600-1608, 2004 - GSM microwaves affect human lymphocyte chromatin similar to stress response at 0.0054 W/kg.

Schwartz et al. Bioelectromagnetics 11(4):349-358, 1990 - calcium movement in the heart affected by RFR at SAR of 0.00015 W/kg. Calcium is important in muscle contraction. Changes in calcium can affect heart functions.

Somosy et al. Scanning Microsc 5(4):1145-1155, 1991 - RFR at 0.024 W/kg caused molecular and structural changes in cells of mouse embryos.

Stagg et al. Bioelectromagnetics 18(3):230-236, 1997- glioma cells exposed to cellular phone RFR at 0.0059 W/kg showed significant increases in thymidine incorporation, which may be an indication of an increase in cell division.

Stark et al. J Pineal Res 22(4):171-176, 1997 - a two- to seven-fold increase of salivary melatonin concentration was observed in dairy cattle exposed to RFR from a radio transmitter antenna.

Tattersall et al. Brain Res 904(1):43-53, 2001 - low-intensity RFR (0.0016 - 0.0044 W/kg) can modulate the function of a part of the brain called the hippocampus, in the absence of gross thermal effects. The changes in excitability may be consistent with reported behavioral effects of RFR, since the hippocampus is involved in learning and memory.

Vangelova et al. Cent Eur J Public Health 10(1-2):24-28, 2002 - operators of satellite station exposed to low dose (0.1127 J/kg) of RFR over a 24-hr shift showed an increased excretion of stress harmones

Velizarov et al. Bioelectrochem Bioenerg 48(1):177-180, 1999 - showed a decrease in cell proliferation (division) after exposure to RFR of 0.000021 - 0.0021 W/kg.

Veyret et al. Bioelectromagnetics 12(1):47-56, 1991 - low intensity RFR at SAR of 0.015 W/kg affects functions of the immune system.

Wolke et al. Bioelectromagnetics 17(2):144-153, 1996 - RFR at 0.001W/kg affects calcium concentration in heart muscle cells of guinea pigs.

Return to Top of Document

The International Association of Fire Fighters recognizes IAFF Local 3368, Carpinteria-Summerland, California, who brought this issue to the attention of our membership through the Resolution 15, submitted through our biennial convention in August 2004. Additionally, the following local affiliates provided support for the passage of the resolution: Brookline, Massachusetts, San Diego, California, San Francisco, California and Vancouver, British Columbia. We also acknowledge the efforts of Dr. Henry C. Lai, University of Washington, Seattle, Washington; Dr. Magda Havas of Trent University, Peterborough, Ontario; Janet Newton, President of the EMR Policy Institute; and Susan Foster Ambrose for their technical support and continued passion to protect the health and safety of fire fighters and emergency medical personnel. Finally, we thenk Dr. Leslie Plachta and the Safe Ossining Schools for their research efforts and their battle to stop siting cell towers on Ossining, New York schools.

RMD: 3/2005

Programs & Services (http://client.prod.iaff.or g/#page=ProgramsAndS ervices) How to Become a Fire Fighter (http://client.prod.iaff.org/# menuid=29) Fire Ops 101 (http://www.iaff.org/et/fireop s101/index.htm) Fire Ground Survival (http://client.prod.iaff.org/# menuid=31) Fit to Survive (http://www.iaff.org/hs/FTS/f tsdefault.asp) HazMat/WMD Training (http://www.iaff.org/et/HW/i ndex.htm?src=web) IAFF Financial Corporation (http://www.iaff-fc.com/bt/) Job Center (http://client.prod.iaff.org/#c ontentid=442) Wellness-Fitness Initiative (http://client.prod.iaff.org/# menuid=1164) Kaplan University (http://client.prod.iaff.org/# menuid=34) Burn Prevention (http://client.prod.iaff.org/# menuid=27) IAFF-MDA (http://client.prod.iaff.org/# menuid=36) Firefighters for Operation

Warm

(http://www.FireFightersOW.

org?target=_blank)

Departments (http://client.prod.iaff.or q/#menuid=1236) Education and Human Relations (http://client.prod.iaff.org/#p age=EducationAndHumanRel Fire and EMS Operations (http://client.prod.iaff.org/#p age=FireAndEmsOperations) Governmental & Public Policy (http://client.prod.iaff.org/#p age=governmental) **Grants Administration** (http://client.prod.iaff.org/# menuid=1122) HazMat/WMD (http://www.iaff.org/et/HW/i ndex.htm?src=web) Health & Safety (http://client.prod.iaff.org/#p age=HealthAndSafety) **Human Relations** (http://www.iaff.org/hr/defau lt.asp) IAFF Canada (http://client.prod.iaff.org/#p age=IAFFCanada) Labor Issues (http://client.prod.iaff.org/#p age=LaborIssuesAndCollectiv eBargaining) Legal (http://client.prod.iaff.org/#p age=LegalDepartment) Media & Communication (http://client.prod.iaff.org/#p

age=MediaAndCommunicatio

ns)

Related Sites (http://client.prod.iaff.or g/#menuid=1127) IAFF Alumni (http://www.iaffalumni.org/) IAFF Frontline Blog (http://blog.iaff.org/) Frontline News Brief (http://client.prod.iaff.org/# menuid=1100) IAFF Motorcycle Group (http://www.iaffmg.org/? target=_blank) IAFF Wine Club (http://www.iaffwines.com) Get It Union (http://www.getitunion.com/) International Fire Fighters Union Alliance (http://www.iffua.org/) Union Sportsmen's Alliance (http://unionsportsmen.org/) IAFF ONLINE (http://www.iaff.org/index.as

IAFF Foundation (http://www.iafffoundati on.org/) Donate (https://member.iaff.org/pvp rod/idonate/ifund.aspx? swCh=f&bBO=PA&AcctGrp= W_FND) Burn Fund (http://www.iafffoundation.or g/causes/burn-fund? target= blank) Disaster Relief (http://www.iafffoundation.or g/causes/disaster-relief-fund) Scholarships (http://www.iaff.org/et/schol arships/) Fallen Fire Fighter Memorial (http://www.iafffoundation.or g/causes/fallen-fire-fightermemorial-fund) Redmond Fund (http://www.iafffoundation.or g/causes/john-p-redmondfund)

Membership (http://client.prod.iaff.org/#p age=MembershipPage) Pension Resources (http://client.prod.iaff.org/#p age=pensionresources) Fire Fighter Quarterly (http://www.iaff.org/mag/)

© 2014 - IAFF

EXHIBIT 21

Biological effects from exposure to electromagnetic radiation emitted by cell tower base stations and other antenna arrays

B. Blake Levitt and Henry Lai

Abstract: The siting of cellular phone base stations and other cellular infrastructure such as roof-mounted antenna arrays, especially in residential neighborhoods, is a contentious subject in land-use regulation. Local resistance from nearby residents and landowners is often based on fears of adverse health effects despite reassurances from telecommunications service providers that international exposure standards will be followed. Both anecdotal reports and some epidemiology studies have found headaches, skin rashes, sleep disturbances, depression, decreased libido, increased rates of suicide, concentration problems, dizziness, memory changes, increased risk of cancer, tremors, and other neurophysiological effects in populations near base stations. The objective of this paper is to review the existing studies of people living or working near cellular infrastructure and other pertinent studies that could apply to long-term, low-level radiofrequency radiation (RFR) exposures. While specific epidemiological research in this area is sparse and contradictory, and such exposures are difficult to quantify given the increasing background levels of RFR from myriad personal consumer products, some research does exist to warrant caution in infrastructure siting. Further epidemiology research that takes total ambient RFR exposures into consideration is warranted. Symptoms reported today may be classic microwave sickness, first described in 1978. Non-ionizing electromagnetic fields are among the fastest growing forms of environmental pollution. Some extrapolations can be made from research other than epidemiology regarding biological effects from exposures at levels far below current exposure guidelines.

Key words: radiofrequency radiation (RFR), antenna arrays, cellular phone base stations, microwave sickness, nonionizing electromagnetic fields, environmental pollution.

Résumé : La localisation des stations de base pour téléphones cellulaires et autres infrastructures cellulaires, comme les installations d'antennes sur les toitures, surtout dans les quartiers résidentiels, constitue un sujet litigieux d'utilisation du territoire. La résistance locale de la part des résidents et propriétaires fonciers limitrophes repose souvent sur les craintes d'effets adverses pour la santé, en dépit des réassurances venant des fournisseurs de services de télécommunication, à l'effet qu'ils appliquent les standards internationaux d'exposition. En plus de rapports anecdotiques, certaines études épidémiologiques font état de maux de tête, d'éruption cutanée, de perturbation du sommeil, de dépression, de diminution de libido, d'augmentations du taux de suicide, de problèmes de concentration, de vertiges, d'altération de la mémoire, d'augmentation du risque de cancers, de trémulations et autres effets neurophysiologiques, dans les populations vivant au voisinage des stations de base. Les auteurs révisent ici les études existantes portant sur les gens, vivant ou travaillant près d'infrastructures cellulaires ou autres études pertinentes qui pourraient s'appliquer aux expositions à long terme à la radiation de radiofréquence de faible intensité « RFR ». Bien que la recherche épidémiologique spécifique dans ce domaine soit rare et contradictoire, et que de telles expositions soient difficiles à quantifier compte tenu des degrés croissants du bruit de fond des RFR provenant de produits de myriades de consommateurs personnels, il existe certaines recherches qui justifient la prudence dans l'installation des infrastructures. Les futures études épidémiologiques sont nécessaires afin de prendre en compte la totalité des expositions à la RFR ambiante. Les symptômes rapportés jusqu'ici pourraient correspondre à la maladie classique des micro-ondes, décrite pour la première fois en 1978. Les champs électromagnétiques non-ionisants constituent les formes de pollution environnementale croissant le plus rapidement. On peut effectuer certaines extrapolations à partir de recherches autres qu'épidémiologiques concernant les effets biologiques d'expositions à des degrés bien au-dessous des directives internationales.

Mots-clés: radiofréquence de faible intensité « RFR », les installations d'antennes, des stations de base pour téléphones cellulaires, la maladie classique des micro-ondes, les champs électromagnétiques non-ionisants, pollution environnementale.

[Traduit par la Rédaction]

Received 30 April 2010. Accepted 6 August 2010. Published on the NRC Research Press Web site at er.nrc.ca on 5 November 2010.

B.B. Levitt. P.O. Box 2014, New Preston, CT 06777, USA.

H. Lai. Department of Bioengineering, Box 355061, University of Washington, Seattle, WA 98195, USA.

¹Corresponding author (e-mail: blakelevit@cs.com; bbl353355@gmail.com).

1. Introduction

Wireless technologies are ubiquitous today. According to the European Information Technology Observatory, an industry-funded organization in Germany, the threshold of 5.1 billion cell phone users worldwide will be reached by the end of 2010 — up from 3.3 billion in 2007. That number is expected to increase by another 10% to 5.6 billion in 2011, out of a total worldwide population of 6.5 billion.² In 2010, cell phone subscribers in the U.S. numbered 287 million, Russia 220 million, Germany 111 million, Italy 87 million, Great Britain 81 million, France 62 million, and Spain 57 million. Growth is strong throughout Asia and in South America but especially so in developing countries where landline systems were never fully established.

The investment firm Bank of America Merril-Lynch estimated that the worldwide penetration of mobile phone customers is twice that of landline customers today and that America has the highest minutes of use per month per user.³ Today, 94% of Americans live in counties with four or more wireless service providers, plus 99% of Americans live in counties where next generation, 3G (third generation), 4G (fourth generation), and broadband services are available. All of this capacity requires an extensive infrastructure that the industry continues to build in the U.S., despite a 93% wireless penetration of the total U.S. population.⁴

Next generation services are continuing to drive the buildout of both new infrastructure as well as adaptation of preexisting sites. According to the industry, there are an estimated 251 618 cell sites in the U.S. today, up from 19 844 in 1995. There is no comprehensive data for antennas hidden inside of buildings but one industry-maintained Web site (www.antennasearch.com), allows people to type in an address and all antennas within a 3 mile (1 mile = 1.6 km) area will come up. There are hundreds of thousands in the U.S. alone.

People are increasingly abandoning landline systems in favor of wireless communications. One estimate in 2006 found that 42% of all wireless subscribers used their wireless phone as their primary phone. According to the National Center for Health Statistics of the U.S. Centers for Disease Control (CDC), by the second half of 2008, one in every five American households had no landlines but did have at least one wireless phone (Department of Health and Human Services 2008). The figures reflected a 2.7% increase over the first half of 2008 — the largest jump since the CDC began tracking such data in 2003, and represented a total of 20.2% of the U.S. population — a figure that coincides with industry estimates of 24.50% of completely wireless households in 2010.5 The CDC also found that approximately 18.7% of all children, nearly 14 million, lived in households with only wireless phones. The CDC further found that one in every seven American homes, 14.5% of the population, received all or almost all of their calls via wireless phones, even when there was a landline in the home. They called these "wireless-mostly households."

The trend away from landline phones is obviously increasing as wireless providers market their services specifically toward a mobile customer, particularly younger adults who readily embrace new technologies. One study (Silke et al. 2010) in Germany found that children from lower socioeconomic backgrounds not only owned more cell phones than children from higher economic groups, but also used their cell phones more often — as determined by the test groups' wearing of personal dosimetry devices. This was the first study to track such data and it found an interesting contradiction to the assumption that higher socioeconomic groups were the largest users of cell services. At one time, cell phones were the status symbol of the wealthy. Today, it is also a status symbol of lower socioeconomic groups. The CDC found in their survey discussed above that 65.3% of adults living in poverty or living near poverty were more likely than higher income adults to be living in households with wireless only telephones. There may be multiple reasons for these findings, including a shift away from cell phone dialogues to texting in younger adults in higher socioeconomic categories.

In some developing countries where landline systems have never been fully developed outside of urban centers, cell phones are the only means of communication. Cellular technology, especially the new 3G, 4G, and broadband services that allow wireless communications for real-time voice communication, text messaging, photos, Internet connections, music and video downloads, and TV viewing, is the fastest growing segment of many economies that are in otherwise sharp decline due to the global economic downturn.

There is some indication that although the cellular phone markets for many European countries are more mature than in the U.S., people there may be maintaining their landline use while augmenting with mobile phone capability. This may be a consequence of the more robust media coverage regarding health and safety issues of wireless technology in the European press, particularly in the UK, as well as recommendations by European governments like France and Germany⁶ that citizens not abandon their landline phones or wired computer systems because of safety concerns. According to OfCom's 2008 Communications Market Interim Report (OfCom 2008), which provided information up to December 2007, approximately 86% of UK adults use cell phones. While four out of five households have both cell phones and landlines, only 11% use cell phones exclusively, a total down from 28% noted by this group in 2005. In addition, 44% of UK adults use text messaging on a daily basis. Fixed landline services fell by 9% in 2007 but OfCom notes that landline services continue to be strong despite the fact that mobile services also continued to grow by 16%. This indicates that people are continuing to use both landlines and wireless technology rather than choosing one over the other in the UK. There were 51 300 UK base station sites in

² http://www.eito.com/pressinformation_20100811.htm. (Accessed October 2010.)

³ http://www.ctia.org/advocacy/research/index.cfm/AID/10377. (Accessed October 2010.)

⁴ http://www.ctia.org/advocacy/research/index.cfm/AID/10323. (Accessed October 2010.)

⁵ http://www.ctia.org/advocacy/research/index.cfm/AID/10323. (Accessed October 2010.)

⁶ http://www.icems.eu/docs/deutscher_bundestag.pdf and http://www.icems.eu/docs/resolutions/EP_EMF_resolution_2APR09.pdf. (Accessed October 2010.)

the beginning of 2009 (two-thirds installed on existing buildings or structures) with an estimated 52 900 needed to accommodate new 3G and 4G services by the end of 2009.

Clearly, this is an enormous global industry. Yet, no money has ever been appropriated by the industry in the U.S., or by any U.S. government agency, to study the potential health effects on people living near the infrastructure. The most recent research has all come from outside of the U.S. According to the CTIA – The Wireless Association, "If the wireless telecom industry were a country, its economy would be bigger than that of Egypt, and, if measured by GNP (gross national product), [it] would rank as the 46th largest country in the world." They further say, "It took more than 21 years for color televisions to reach 100 million consumers, more than 90 years for landline service to reach 100 million consumers, and less than 17 years for wireless to reach 100 million consumers."

In lieu of building new cell towers, some municipalities are licensing public utility poles throughout urban areas for Wi-Fi antennas that allow wireless Internet access. These systems can require hundreds of antennas in close proximity to the population with some exposures at a lateral height where second- and third-storey windows face antennas. Most of these systems are categorically excluded from regulation by the U.S. Federal Communications Commission (FCC) or oversight by government agencies because they operate below a certain power density threshold. However, power density is not the only factor determining biological effects from radiofrequency radiation (RFR).

In addition, when the U.S. and other countries permanently changed from analog signals used for television transmission to newer digital formats, the old analog frequencies were reallocated for use by municipal services such as police, fire, and emergency medical dispatch, as well as to private telecommunications companies wanting to expand their networks and services. This creates another significant increase in ambient background exposures.

Wi-Max is another wireless service in the wings that will broaden wireless capabilities further and place additional towers and (or) transmitters in close proximity to the population in addition to what is already in existence. Wi-Max aims to make wireless Internet access universal without tying the user to a specific location or "hotspot." The rollout of Wi-Max in the U.S., which began in 2009, uses lower frequencies at high power densities than currently used by cellular phone transmission. Many in science and the activist communities are worried, especially those concerned about electromagnetic-hypersensitivity syndrome (EHS).

It remains to be seen what additional exposures "smart grid" or "smart meter" technology proposals to upgrade the electrical powerline transmission systems will entail regarding total ambient RFR increases, but it will add another ubiquitous low-level layer. Some of the largest corporations on earth, notably Siemens and General Electric, are involved. Smart grids are being built out in some areas of the U.S. and in Canada and throughout Europe. That technology plans to alter certain aspects of powerline utility metering from a wired system to a partially wireless one. The systems require a combination of wireless transmitters attached to

homes and businesses that will send radio signals of approximately 1 W output in the 2.4000-2.4835 GHz range to local "access point" transceivers, which will then relay the signal to a further distant information center (Tell 2008). Access point antennas will require additional power density and will be capable of interfacing with frequencies between 900 MHz and 1.9 GHz. Most signals will be intermittent, operating between 2 to 33 seconds per hour. Access points will be mounted on utility poles as well as on free-standing towers. The systems will form wide area networks (WANs), capable of covering whole towns and counties through a combination of "mesh-like" networks from house to house. Some meters installed on private homes will also act as transmission relays, boosting signals from more distant buildings in a neighborhood. Eventually, WANs will be completely linked.

Smart grid technology also proposes to allow homeowners to attach additional RFR devices to existing indoor appliances, to track power use, with the intention of reducing usage during peak hours. Manufacturers like General Electric are already making appliances with transmitters embedded in them. Many new appliances will be incapable of having transmitters deactivated without disabling the appliance and the warranty. People will be able to access their home appliances remotely by cell phone. The WANs smart grids described earlier in the text differ significantly from the current upgrades that many utility companies have initiated within recent years that already use low-power RFR meters attached to homes and businesses. Those first generation RFR meters transmit to a mobile van that travels through an area and "collects" the information on a regular billing cycle. Smart grids do away with the van and the meter reader and work off of a centralized RFR antenna system capable of blanketing whole regions with RFR.

Another new technology in the wings is broadband over powerlines (BPL). It was approved by the U.S. FCC in 2007 and some systems have already been built out. Critics of the latter technology warned during the approval process that radiofrequency interference could occur in homes and businesses and those warnings have proven accurate. BPL technology couples radiofrequency bands with extremely low frequency (ELF) bands that travel over powerline infrastructure, thereby creating a multi-frequency field designed to extend some distance from the lines themselves. Such couplings follow the path of conductive material, including secondary distribution lines, into people's homes.

There is no doubt that wireless technologies are popular with consumers and businesses alike, but all of this requires an extensive infrastructure to function. Infrastructure typically consists of freestanding towers (either preexisting towers to which cell antennas can be mounted, or new towers specifically built for cellular service), and myriad methods of placing transceiving antennas near the service being called for by users. This includes attaching antenna panels to the sides of buildings as well as roof-mountings; antennas hidden inside church steeples, barn silos, elevator shafts, and any number of other "stealth sites." It also includes camouflaging towers to look like trees indigenous to areas where they are placed, e.g., pine trees in northern climates, cacti

⁷CTIA website: http://www.ctia.org/advocay/research/index.cfm/AID/10385. (Accessed 9 December 2008.)

in deserts, and palm trees in temperate zones, or as chimneys, flagpoles, silos, or other tall structures (Rinebold 2001). Often the rationale for stealth antenna placement or camouflaging of towers is based on the aesthetic concerns of host communities.

An aesthetic emphasis is often the only perceived control of a municipality, particularly in countries like America where there is an overriding federal preemption that precludes taking the "environmental effects" of RFR into consideration in cell tower siting as stipulated in Section 704 of *The Telecommunications Act of 1996* (USFCC 1996). Citizen resistance, however, is most often based on health concerns regarding the safety of RFR exposures to those who live near the infrastructure. Many citizens, especially those who claim to be hypersensitive to electromagnetic fields, state they would rather know where the antennas are and that hiding them greatly complicates society's ability to monitor for safety.⁸

Industry representatives try to reassure communities that facilities are many orders of magnitude below what is allowed for exposure by standards-setting boards and studies bear that out (Cooper et al. 2006; Henderson and Bangay 2006; Bornkessel et al. 2007). These include standards by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) used throughout Europe, Canada, and elsewhere (ICNIRP 1998). The standards currently adopted by the U.S. FCC, which uses a two-tiered system of recommendations put out by the National Council on Radiation Protection (NCRP) for civilian exposures (referred to as uncontrolled environments), and the International Electricians and Electronics Engineers (IEEE) for professional exposures (referred to as controlled environments) (U.S. FCC 1997). The U.S. may eventually adopt standards closer to ICNIRP. The current U.S. standards are more protective than IC-NIRP's in some frequency ranges so any harmonization toward the ICNIRP standards will make the U.S. limits more

All of the standards currently in place are based on RFRs ability to heat tissue, called thermal effects. A longstanding criticism, going back to the 1950s (Levitt 1995), is that such acute heating effects do not take potentially more subtle non-thermal effects into consideration. And based on the number of citizens who have tried to stop cell towers from being installed in their neighborhoods, laypeople in many countries do not find adherence to exisiting standards valid in addressing health concerns. Therefore, infrastructure siting does not have the confidence of the public (Levitt 1998).

2. A changing industry

Cellular phone technology has changed significantly over the last two decades. The first wireless systems began in the mid-1980s and used analog signals in the 850–900 MHz range. Because those wavelengths were longer, infrastructure was needed on average every 8 to 10 miles apart. Then came the digital personal communications systems (PCS) in the late 1990s, which used higher frequencies, around 1900 GHz, and digitized signals. The PCS systems, using shorter wavelengths and with more stringent exposure guide-

lines, require infrastructure approximately every 1 to 3 miles apart. Digital signals work on a binary method, mimicking a wave that allows any frequency to be split in several ways, thereby carrying more information far beyond just voice messages.

Today's 3G network can send photos and download music and video directly onto a cell phone screen or iPod. The new 4G systems digitize and recycle some of the older frequencies in the 700 to 875 MHz bands to create another service for wireless Internet access. The 4G network does not require a customer who wants to log on wirelessly to locate a "hot spot" as is the case with private Wi-Fi systems. Today's Wi-Fi uses a network of small antennas, creating coverage of a small area of 100 ft (\sim 30 m) or so at homes or businesses. Wi-fi can also create a small wireless computer system in a school where they are often called wireless local area networks (WLANs). Whole cities can make Wi-Fi available by mounting antennas to utility poles.

Large-scale Wi-Fi systems have come under increasing opposition from citizens concerned about health issues who have legally blocked such installations (Antenna Free Union⁹). Small-scale Wi-Fi has also come under more scrutiny as governments in France and throughout Europe have banned such installations in libraries and schools, based on precautionary principles (REFLEX Program 2004).

3. Cell towers in perspective: some definitions

Cell towers are considered low-power installations when compared to many other commercial uses of radiofrequency energy. Wireless transmission for radio, television (TV), satellite communications, police and military radar, federal homeland security systems, emergency response networks, and many other applications all emit RFR, sometimes at millions of watts of effective radiated power (ERP). Cellular facilities, by contrast, use a few hundred watts of ERP per channel, depending on the use being called for at any given time and the number of service providers co-located at any given tower.

No matter what the use, once emitted, RFR travels through space at the speed of light and oscillates during propagation. The number of times the wave oscillates in one second determines its frequency.

Radiofrequency radiation covers a large segment of the electromagnetic spectrum and falls within the nonionizing bands. Its frequency ranges between 10 kHz to 300 GHz; 1 Hz = 1 oscillation per second; 1 kHz = 1000 Hz; 1 MHz = 1000 000 Hz; and 1 GHz = 1000 000 000 Hz.

Different frequencies of RFR are used in different applications. Some examples include the frequency range of 540 to 1600 kHz used in AM radio transmission; and 76 to 108 MHz used for FM radio. Cell-phone technology uses frequencies between 800 MHz and 3 GHz. The RFR of 2450 MHz is used in some Wi-Fi applications and microwave cooking.

Any signal can be digitized. All of the new telecommunications technologies are digitized and in the U.S., all TV is

⁸ See, for example, www.radiationresearch.org. (Accessed October 2010.)

⁹ http://www.antennafreeunion.org/. (Accessed October 2010.)

broadcast in 100% digital formats — digital television (DTV) and high definition television (HDTV). The old analog TV signals, primarily in the 700 MHz ranges, will now be recycled and relicensed for other applications to additional users, creating additional layers of ambient exposures.

The intensity of RFR is generally measured and noted in scientific literature in watts per square meter (W/m²); milliwatts per square centimetre (mW/cm²), or microwatts per square centimetre (μ W/cm²). All are energy relationships that exist in space. However, biological effects depend on how much of the energy is absorbed in the body of a living organism, not just what exists in space.

4. Specific absorption rate (SAR)

Absorption of RFR depends on many factors including the transmission frequency and the power density, one's distance from the radiating source, and one's orientation toward the radiation of the system. Other factors include the size, shape, mineral and water content of an organism. Children absorb energy differently than adults because of differences in their anatomies and tissue composition. Children are not just "little adults". For this reason, and because their bodies are still developing, children may be more susceptible to damage from cell phone radiation. For instance, radiation from a cell phone penetrates deeper into the head of children (Gandhi et al. 1996; Wiart et al. 2008) and certain tissues of a child's head, e.g., the bone marrow and the eye, absorb significantly more energy than those in an adult head (Christ et al. 2010). The same can be presumed for proximity to towers, even though exposure will be lower from towers under most circumstances than from cell phones. This is because of the distance from the source. The transmitter is placed directly against the head during cell phone use whereas proximity to a cell tower will be an ambient exposure at a distance.

There is little difference between cell phones and the domestic cordless phones used today. Both use similar frequencies and involve a transmitter placed against the head. But the newer digitally enhanced cordless technology (DECT) cordless domestic phones transmit a constant signal even when the phone is not in use, unlike the older domestic cordless phones. But some DECT brands are available that stop transmission if the mobile units are placed in their docking station.

The term used to describe the absorption of RFR in the body is specific absorption rate (SAR), which is the rate of energy that is actually absorbed by a unit of tissue. Specific absorption rates (SARs) are generally expressed in watts per kilogram (W/kg) of tissue. The SAR measurements are averaged either over the whole body, or over a small volume of tissue, typically between 1 and 10 g of tissue. The SAR is used to quantify energy absorption to fields typically between 100 kHz and 10 GHz and encompasses RFR from devices such as cellular phones up through diagnostic MRI (magnetic resonance imaging).

Specific absorption rates are a more reliable determinant and index of RFR's biological effects than are power density, or the intensity of the field in space, because SARs reflect what is actually being absorbed rather than the energy in space. However, while SARs may be a more precise model, at least in theory, there were only a handful of animal studies that were used to determine the threshold values of SAR for the setting of human exposure guidelines (de Lorge and Ezell 1980; de Lorge 1984). (For further information see Section 8). Those values are still reflected in today's standards.

It is presumed that by controlling the field strength from the transmitting source that SARs will automatically be controlled too, but this may not be true in all cases, especially with far-field exposures such as near cell or broadcast towers. Actual measurement of SARs is very difficult in real life so measurements of electric and magnetic fields are used as surrogates because they are easier to assess. In fact, it is impossible to conduct SAR measurements in living organisms so all values are inferred from dead animal measurements (thermography, calorimetry, etc.), phantom models, or computer simulation (FDTD).

However, according to the Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) *Health Effects of Exposure to EMF*, released in January of 2009:

... recent studies of whole body plane wave exposure of both adult and children phantoms demonstrated that when children and small persons are exposed to levels which are in compliance with reference levels, exceeding the basic restrictions cannot be excluded [Dimbylow and Bloch 2007; Wang et al. 2006; Kuhn et al., 2007; Hadjem et al., 2007]. While the whole frequency range has been investigated, such effects were found in the frequency bands around 100 MHz and also around 2 GHz. For a model of a 5-year-old child it has been shown that when the phantom is exposed to electromagnetic fields at reference levels, the basic restrictions were exceeded by 40% [Conil et al., 2008].... Moreover, a few studies demonstrated that multipath exposure can lead to higher exposure levels compared to plane wave exposure [Neubauer et al. 2006; Vermeeren et al. 2007]. It is important to realize that this issue refers to far field exposure only, for which the actual exposure levels are orders of magnitude below existing guidelines. (p. 34-35, SCENIHR 2009)

In addition to average SARs, there are indications that biological effects may also depend on how energy is actually deposited in the body. Different propagation characteristics such as modulation, or different wave-forms and shapes, may have different effects on living systems. For example, the same amount of energy can be delivered to tissue continuously or in short pulses. Different biological effects may result depending on the type and duration of the exposure.

5. Transmission facilities

The intensity of RFR decreases rapidly with the distance from the emitting source; therefore, exposure to RFR from transmission towers is often of low intensity depending on one's proximity. But intensity is not the only factor. Living near a facility will involve long-duration exposures, sometimes for years, at many hours per day. People working at home or the infirm can experience low-level 24 h exposures. Nighttimes alone will create 8 h continuous exposures. The current standards for both ICNIRP, IEEE and the NCRP (adopted by the U.S. FCC) are for whole-body exposures

averaged over a short duration (minutes) and are based on results from short-term exposure studies, not for long-term, low-level exposures such as those experienced by people living or working near transmitting facilities. For such populations, these can be involuntary exposures, unlike cell phones where user choice is involved.

There have been some recent attempts to quantify human SARs in proximity to cell towers but these are primarily for occupational exposures in close proximity to the sources and questions raised were dosimetry-based regarding the accuracy of antenna modeling (van Wyk et al. 2005). In one study by Martínez-Búrdalo et al. (2005) however, the researchers used high-resolution human body models placed at different distances to assess SARs in worst-case exposures to three different frequencies — 900, 1800, and 2170 MHz. Their focus was to compute whole-body averaged SARs at a maximum 10 g averaged SAR inside the exposed model. They concluded that for

... antenna-body distances in the near zone of the antenna, the fact that averaged field values are below reference levels, could, at certain frequencies, not guarantee guidelines compliance based on basic restrictions.

(p. 4125, Martínez-Búrdalo et al. 2005)

This raises questions about the basic validity of predicting SARs in real-life exposure situations or compliance to guidelines according to standard modeling methods, at least when one is very close to an antenna.

Thus, the relevant questions for the general population living or working near transmitting facilities are: Do biological and (or) health effects occur after exposure to low-intensity RFR? Do effects accumulate over time, since the exposure is of a long duration and may be intermittent? What precisely is the definition of low-intensity RFR? What might its biological effects be and what does the science tell us about such exposures?

6. Government radiofrequency radiation (RFR) guidelines: how spatial energy translates to the body's absorption

The U.S. FCC has issued guidelines for both power density and SARs. For power density, the U.S. guidelines are between 0.2–1.0 mW/cm². For cell phones, SAR levels require hand-held devices to be at or below 1.6 W/kg measured over 1.0 g of tissue. For whole body exposures, the limit is 0.08 W/kg.

In most European countries, the SAR limit for hand-held devices is 2.0 W/kg averaged over 10 g of tissue. Whole body exposure limits are 0.08 W/kg.

At 100-200 ft ($\sim 30-60$ m) from a cell phone base station, a person can be exposed to a power density of 0.001 mW/cm² (i.e., 1.0 μ W/cm²). The SAR at such a distance can be 0.001 W/kg (i.e., 1.0 mW/kg). The U.S. guidelines for SARs are between 0.08-0.40 W/kg.

For the purposes of this paper, we will define low-intensity exposure to RFR of power density of 0.001 mW/cm² or a SAR of 0.001 W/kg.

7. Biological effects at low intensities

Many biological effects have been documented at very low intensities comparable to what the population experiences within 200 to 500 ft (~60–150 m) of a cell tower, including effects that occurred in studies of cell cultures and animals after exposures to low-intensity RFR. Effects reported include: genetic, growth, and reproductive; increases in permeability of the blood-brain barrier; behavioral; molecular, cellular, and metabolic; and increases in cancer risk. Some examples are as follows:

- Dutta et al. (1989) reported an increase in calcium efflux in human neuroblastoma cells after exposure to RFR at 0.005 W/kg. Calcium is an important component in normal cellular functions.
- Fesenko et al. (1999) reported a change in immunological functions in mice after exposure to RFR at a power density of 0.001 mW/cm².
- Magras and Xenos (1997) reported a decrease in reproductive function in mice exposed to RFR at power densities of 0.000168–0.001053 mW/cm².
- Forgacs et al. (2006) reported an increase in serum testosterone levels in rats exposed to GSM (global system for mobile communication)-like RFR at SAR of 0.018–0.025 W/kg.
- Persson et al. (1997) reported an increase in the permeability of the blood-brain barrier in mice exposed to RFR at 0.0004-0.008 W/kg. The blood-brain barrier is a physiological mechanism that protects the brain from toxic substances, bacteria, and viruses.
- Phillips et al. (1998) reported DNA damage in cells exposed to RFR at SAR of 0.0024–0.024 W/kg.
- Kesari and Behari (2009) also reported an increase in DNA strand breaks in brain cells of rats after exposure to RFR at SAR of 0.0008 W/kg.
- Belyaev et al. (2009) reported changes in DNA repair mechanisms after RFR exposure at a SAR of 0.0037 W/kg. A list of publications reporting biological and (or) health effects of low-intensity RFR exposure is in Table 1.

Out of the 56 papers in the list, 37 provided the SAR of exposure. The average SAR of these studies at which biological effects occurred is 0.022 W/kg — a finding below the current standards.

Ten years ago, there were only about a dozen studies reporting such low-intensity effects; currently, there are more than 60. This body of work cannot be ignored. These are important findings with implications for anyone living or working near a transmitting facility. However, again, most of the studies in the list are on short-term (minutes to hours) exposure to low-intensity RFR. Long-term exposure studies are sparse. In addition, we do not know if all of these reported effects occur in humans exposed to low-intensity RFR, or whether the reported effects are health hazards. Biological effects do not automatically mean adverse health effects, plus many biological effects are reversible. However, it is clear that low-intensity RFR is not biologically inert. Clearly, more needs to be learned before a presumption of safety can continue to be made regarding placement of antenna arrays near the population, as is the case today.

Table 1. List of studies reporting biological effects at low intensities of radiofrequency radiation (RFR).

Dafarenco	,	Exem of DED	Democratic	SAR	Power density	P. C. Contractor
Neiclence	riequency	FUILI OI NER	Exposure umanon	(W/Kg)	(µw/cm²)	Effects reported
Balmori (2010) (in vivo) (eggs and tadpoles of frog)	88.5-1873.6 MHz	Cell phone base station emission	2 months		3.25	Retarded development
Belyaev et al. (2005) (in vitro)	915 MHz	GSM	24, 48 h	0.037		Genetic changes in human white blood cells
Belyaev et al. (2009) (in vitro)	915 MHz, 1947 MHz	GSM, UMTS	24, 72 h	0.037		DNA repair mechanism in human white blood cells
Blackman et al. (1980) (in vitro)	50 MHz	AM at 16 Hz		0.0014		Calcium in forebrain of chickens
Boscol et al. (2001) (in vivo) (human whole body)	500 KHz-3 GHz	TV broadcast			0.5	Immunological system in women
Campisi et al. (2010) (in vitro)	900 MHz	CW (CW- no effect observed) AM at 50 Hz	14 days, 5, 10, 20 min per day		26	DNA damage in human glial cells
Capri et al. (2004) (in vitro)	900 MHz	GSM	1 h/day, 3 days	0.07		A slight decrease in cell proliferation when human immune cells were stimulated with mitogen and a
						slight increase in the number of cells with altered distribution of phosphatidylserine across the
Chiang et al. (1989) (in vivo) (human whole body)	Lived and worked close to AM rad installations for more than 1 year	Lived and worked close to AM radio and radar installations for more than 1 year			10	People lived and worked near AM radio autennas and radar installations showed deficits in psychological and short-lerm memory tests
de Pomerai et al. (2003) (in vitro)	1 GHz		24, 48 h	0.015		Protein damages
D'Inzeo et al. (1988) (in vitro)	10.75 GHz	CW	30–120 s	0.008		Operation of acetylcholine-related ion-channels in cells. These channels play important roles in physiological and behavioral functions
Dutta et al. (1984) (in vitro)	915 MHz	Sinusoidal AM at 16 Hz	30 min	50.0		Increase in calcium efflux in brain
Dutta et al. (1989) (in vitro)	147 MHz	Sinusoidal AM at 16 Hz	30 min	0.005		Increase in calcium efflux in brain cancer cells
Fesenko et al. (1999) (in vivo) (mouse- wavelength in mm range)	From 8.15-18 GHz		5 h to 7 days direction of response depended on exposure duration		1	Change in immunological functions
Forgacs et al. (2006) (in vivo) (mouse whole body)	1800 MHz	GSM, 217 Hz pulses, 576 µs pulse width	2 h/day, 10 days	0.018		Increase in serum testosterone
Guler et al. (2010) (In vivo) (rabbit whole body)	1800 MHz	AM at 217 Hz	15 min/day, 7 days	,	52	Oxidative lipid and DNA damages in the brain of pregnant rabbits

able 1 (continued).

Reference	Frequency	Form of RFR	Exposure duration	SAR (W/kg)	Power density (µW/cm²)	Effects reported
Hjollund et al. (1997) (in vivo) (human partial or whole body)	Military radars				01	Sperm counts of Danish military personnel, who operated mobile
	X					ground-to-an missive units and use several RFR emitting radar sys- tems, were significantly lower
Jvaschuk et al. (1997) (in vitro)	836.55 MHz	TDMA	20 min	0.026		A gene related to cancer
Jech et al. (2001) (in vivo)	900 MHz	GSM—217 Hz	45 min	90:0		Improved cognitive functions
(human partial body exposure- narcoleptic patients)		pulses, 577 µs pulse width				
Kesari and Behari (2009) (in vivo) (rat whole body)	50 GHz		2 h/day, 45 days	0.0008		Double strand DNA breaks observed in brain cells
Kesari and Behari (2010) (in vivo) (rat whole body)	$50~\mathrm{GHz}$		2 h/day, 45 days	0.0008		Reproductive system of male rats
Kesari et al. (2010) (in vivo) (rat whole body)	2450 MHz	50 Hz modulation	2 h/day, 35 days	0.11		DNA double strand breaks in brain cells
Kwee et al. (2001) (in vitro)	960 MHz	GSM	20 min	0.0021		Increased stress protein in human epithelial amnion cells
Lebedeva et al. (2000) (in vivo) (human partial body)	902.4 MHz	GSM	20 min		09	Brain wave activation
Lerchl et al. (2008) (in vivo) (hamster whole body)	383 MHz 900 and 1800 MHz	TETRA	24 h/day, 60 days	80.0		Metabolic changes
Magras and Xenos (1997) (in vivo) (mouse whole body)	"Antenna park"	TV and FM-radio	Exposure over several generations		0.168	Decrease in reproductive function
Mann et al. (1998) (in vivo) (human whole body)	900 MHz	GSM pulse-modulated at 217 Hz, 577 µs width	. u		20	A transient increase in blood cortisol
Marinelli et al. (2004) (in vitro)	900 MHz	CW	2-48 h	0.0035		Cell's self-defense responses trig- oered by DNA damage
Markovà et al. (2005) (in vitro)	915 and 905 MHz	GSM	1 h	0.037		Chromatin conformation in human white blood cells
Navakatikian and Tomashevs- kaya (1994) (in vivo) (rat whole body)	2450 MHz 3000 MHz	CW (no effect observed) Pulse-modulated 2 µs pulses at 400 Hz	Single (0.5–12hr) or repeated (15–60 days, 7–12 lv/day) exposure, CW–no effect	0.0027		Behavioral and endocrine changes, and decreases in blood concentra- tions of testosterone and insulin
Nitby et al. (2008) (in vivo) (rat whole body)	900 MHz,	GSM	2 h/week, 55 weeks	9000.0		Reduced memory functions
Novoselova et al. (1999) (in vivo) (mouse whole body – wavelength in mm range)	From 8.15-18 GHz		1 s sweep time – 16 ms reverse, 5 h		1	Functions of the immune system
Novoselova et al. (2004) (in vivo) (mouse whole body – wavelength in mm range)	From 8.15–18 GHz		1 s sweep time16 ms reverse, 1.5 h/day, 30 days			Decreased tumor growth rate and enhanced survival

Table 1 (continued).

				SAR	Power density	
Reference	Frequency	Form of RFR	Exposure duration	(W/kg)	(μW/cm²)	Effects reported
Panagopoulos et al. (2010) (in vivo) (fly whole body)	900 and 1800 MHz	GSM	6 min/day, 5 days		I-10	Reproductive capacity and induced cell death
Panagopoulos and Margaritis (2010a) (in vivo) (fly whole body)	900 and 1800 MHz	GSM	6 min/day, 5 days		10	"Window" effect of GSM radiation on reproductive capacity and cell death
Panagopoulos and Margaritis (2010b) (in vivo) (fly whole body)	900 and 1800 MHz	GSM	1-21 min/day, 5 days		10	Reproductive capacity of the fly decreased linearly with increased duration of exposure
Pavicic and Trosic (2008) (in vitro)	864 and 935 MHz	CW	1–3 h	80.0		Growth affected in Chinese hamster V79 cells
Pérez-Castejón et al. (2009) (in vitro)	9.6 GHz	90% AM	24 h	0.0004		Increased proliferation rate in human astrocytoma cancer cells
Persson et al. (1997) (in vivo) (mouse whole body)	915 MHz	CW and pulse- modulated (217 Hz, 0.57 ms; 50 Hz, 6.6 ms)	2–960 min; CW more potent	0.0004		Increase in permeability of the blood-brain barrier
Phillips et al. (1998) (in vitro)	813.5625 MHz 836.55 MHz	iDEN TDMA	2, 21 h 2, 21 h	0.0024		DNA damage in human leukemia cells
Pologea-Moraru et al. (2002) (in vitro)	2.45 GHz		1 h		15	Change in membrane of cells in the retina
Pyrpasopoulou et al. (2004) (in vivo) (rat whole body)	9.4 GHz	GSM (50 Hz pulses, 20 µs pulse length)	1-7 days postcoitum	0.0005		Exposure during early gestation af- fected kidney develonment
Roux et al. (2008a) (in vivo) (tomato whole body)	900 MHz	•			7	Gene expression and energy metabolism
Roux et al. $(2008b)$ (in vivo) (plant whole body)	900 MHz				7	Energy metabolism
Salford et al. (2003) (in vivo) (rat whole body)	915 MHz	GSM	2 h	0.02		Nerve cell damage in brain
Sarimov et al. (2004) (in vitro)	895–915 MHz	GSM	30 min	0.0054		Human lymphocyte chromatin af- fected cimilar to etreec reconse
Schwartz et al. (1990) (in vitro)	240 MHz	CW and sinusoidal modulation at 0.5 and 16 Hz, effect only observed at 16 Hz modulation	30 min	0.00015		Calcium movement in the heart
Schwarz et al. (2008) (in vitro) Somosy et al. (1991) (in vitro)	1950 MHz 2.45 GHz	UMTS CW and 16 Hz square-modulation, modulated field more potent than CW	24 h	0.05		Genes in human fibroblasts Molecular and structural changes in cells of mouse embryos

Table 1 (concluded).

				SAR	Power density	
Reference	Frequency	Form of RFR	Exposure duration	(W/kg)	$(\mu W/cm^2)$	Effects reported
Stagg et al. (1997) (in vitro)	836.55 MHz	TDMA duty cycle	24 h	0.0059		Glioma cells showed significant in-
		33%				creases in thymidine incorporation,
						which may be an indication of an
						increase in cell division
Stankiewicz et al. (2006) (in vitro)	900 MHz	GSM 217 Hz pulses, 577 ms width		0.024		Innune activities of human white blood cells
Tattersall et al. (2001) (in vitro)	700 MHz	CW	5-15 min	0.0016		Function of the hippocampus
Velizarov et al. (1999) (in vitro)	960 MHz	GSM 217 Hz square- pulse, duty cycle	30 min	0.000021		Decrease in proliferation of human epithelial armion cells
Veyret et al. (1991) (in vivo)	9.4 GHz	1 µs pulses at 1000 pps, also with or without	us pulses at 1000 pps, also with or without	0.015		Functions of the immune system
(modes) where cody)		sponse only with AM, direct depended on AM frequency	strusouda AM Delween 14 and 41 MHZ, 10- sponse only with AM, direction of response depended on AM frequency			
Vian et al. (2006) (in vivo) plant	900 MHz	•			7	Stress gene expression
Wolke et al. (1996) (in vitro)	900, 1300, 1800 MHz	Square-wave modulated at 217 Hz	1 at 217 Hz	0.001		Calcium concentration in heart mus-
	900 MHz	CW, 16 Hz, 50 Hz, and 30 KHz modulations	130 KHz modulations			cle cells of guinea pig
Yurekli et al. (2006) (in vivo)	945 MHz	GSM, 217 Hz pulse-	7 h/day, 8 days	0.0113		Free radical chemistry
(rat wildie oudy)		modulation				

Note: These papers gave either specific absorption rate, SAR, (W/kg) or power density (µW/cm²) of exposure. (Studies that did not contain these values were excluded). AM, amplitude-modulation: CW, continuous wave; GSM, global system for mobile communication; iDEN, integrated digital enhanced network; TDMA, time division multiple access, TETRA, terrestrial trunked radio; UMTS, universal mobile telecommunications system.

8. Long-term exposures and cumulative effects

There are many important gaps in the RFR research. The majority of the studies on RFR have been conducted with short-term exposures, i.e., a few minutes to several hours. Little is known about the effects of long-term exposure such as would be experienced by people living near telecommunications installations, especially with exposures spanning months or years. The important questions then are: What are the effects of long-term exposure? Does long-term exposure produce different effects from short-term exposure? Do effects accumulate over time?

There is some evidence of cumulative effects. Phillips et al. (1998) reported DNA damage in cells after 24 h exposure to low-intensity RFR. DNA damage can lead to gene mutation that accumulates over time. Magras and Xenos (1997) reported that mice exposed to low-intensity RFR became less reproductive. After five generations of exposure the mice were not able to produce offspring. This shows that the effects of RFR can pass from one generation to another. Persson et al. (1997) reported an increase in permeability of the blood-brain barrier in mice when the energy deposited in the body exceeded 1.5 J/kg (joule per kilogram) — a measurement of the total amount of energy deposited. This suggests that a short-term, high-intensity exposure can produce the same effect as a long-term, low-intensity exposure, and is another indication that RFR effects can accumulate over time.

In addition, there is some indication that test animals become more sensitive to radiation after long-term exposure as seen in two of the critical experiments that contributed to the present SAR standards, called the "behavior-disruption experiments" carried out in the 1980s.

In the first experiment, de Lorge and Ezell (1980) trained rats on an auditory observing-response task. In the task, an animal was presented with two bars. Pressing the right bar would produce either a low-pitch or a high-pitch tone for half a second. The low-pitch tone signaled an unrewarded situation and the animal was expected to do nothing. However, when the high-pitch tone was on, pressing the left bar would produce a food reward. Thus, the task required continuous vigilance in which an animal had to coordinate its motor responses according to the stimulus presented to get a reward by choosing between a high-pitch or low-pitch tone. After learning the task, rats were then irradiated with 1280 MHz or 5620 MHz RFR during performance. Disruption of behavior (i.e., the rats could not perform very well) was observed within 30-60 min of exposure at a SAR of 3.75 W/kg for 1280 MHz, and 4.9 W/kg for 5620 MHz.

In another experiment, de Lorge (1984) trained monkeys on a similar auditory observing response task. Monkeys were exposed to RFR at 225, 1300, and 5800 MHz. Disruption of performance was observed at 8.1 mW/cm² (SAR 3.2 W/kg) for 225 MHz; at 57 mW/cm² (SAR 7.4 W/kg) for 1300 MHz; and at 140 mW/cm² (SAR 4.3 W/kg) for 5800 MHz. The disruption occurred when body temperature was increased by 1°C.

The conclusion from these experiments was that "... disruption of behavior occurred when an animal was exposed at an SAR of approximately 4 W/kg, and disruption

occurred after 30–60 minutes of exposure and when body temperature increased by 1°C" (de Lorge 1984). Based on just these two experiments, 4 W/kg has been used in the setting of the present RFR exposure guidelines for humans. With theoretical safety margins added, the limit for occupational exposure was then set at 0.4 W/kg (i.e., 1/10 of the SAR where effects were observed) and for public exposure 0.08 W/kg for whole body exposures (i.e., 1/5 of that of occupational exposure).

But the relevant question for establishing a human SAR remains: Is this standard adequate, based on so little data, primarily extrapolated from a handful of animal studies from the same investigators? The de Lorge (1984) animal studies noted previously describe effects of short-term exposures, defined as less than one hour. But are they comparable to long-term exposures like what whole populations experience when living or working near transmitting facilities?

Two series of experiments were conducted in 1986 on the effects of long-term exposure. D'Andrea et al. (1986a) exposed rats to 2450 MHz RFR for 7 h a day, 7 days per week for 14 weeks. They reported a disruption of behavior at an SAR of 0.7 W/kg. And D'Andrea et al. (1986b) also exposed rats to 2450 MHz RFR for 7 h a day, 7 days per week, for 90 days at an SAR of 0.14 W/kg and found a small but significant disruption in behavior. The experimenters concluded, "... the threshold for behavioral and physiological effects of chronic (long-term) RFR exposure in the rat occurs between 0.5 mW/cm² (0.14 W/kg) and 2.5 mW/cm² (0.7 W/kg)" (p. 55, D'Andrea et al. 1986b).

The previously mentioned studies show that RFR can produce effects at much lower intensities after test animals are repeatedly exposed. This may have implications for people exposed to RFR from transmission towers for long periods of time.

Other biological outcomes have also been reported after long-term exposure to RFR. Effects were observed by Baranski (1972) and Takashima et al. (1979) after prolonged, repeated exposure but not after short-term exposure. Conversely, in other work by Johnson et al. (1983), and Lai et al. (1987, 1992) effects that were observed after short-term exposure disappeared after prolonged, repeated exposure, i.e., habituation occurred. Different effects were observed by Dumansky and Shandala (1974) and Lai et al. (1989) after different exposure durations. The conclusion from this body of work is that effects of long-term exposure can be quite different from those of short-term exposure.

Since most studies with RFR are short-term exposure studies, it is not valid to use their results to set guidelines for long-term exposures, such as in populations living or working near cell phone base stations.

9. Effects below 4 W/kg: thermal versus nonthermal

As described previously, current international RFR exposure standards are based mainly on the acute exposure experiments that showed disruption of behavior at 4 W/kg. However, such a basis is not scientifically valid. There are many studies that show biological effects at SARs less than 4 W/kg after short-term exposures to RFR. For example, since the 4 W/kg originated from psychological and (or) be-

havioral experiments, when one surveys the EMF literature on behavioral effects, one can find many reports on behavioral effects observed at SARs less than 4 W/kg, e.g., D'Andrea et al. (1986a) at 0.14 to 0.7 W/kg; DeWitt et al. (1987) at 0.14 W/kg; Gage (1979) at 3 W/kg; King et al. (1971) at 2.4 W/kg; Kumlin et al. (2007) at 3 W/kg; Lai et al. (1989) at 0.6 W/kg; Mitchell et al. (1977) at 2.3 W/kg (1977); Navakatikian and Tomashevskaya (1994) at 0.027 W/kg; Nittby et al. (2008) at 0.06 W/kg; Schrot et al. (1980) at 0.7 W/kg; Thomas et al. (1975) at 1.5 to 2.7 W/kg; and Wang and Lai (2000) at 1.2 W/kg.

The obvious mechanism of effects of RFR is thermal (i.e., tissue heating). However, for decades, there have been questions about whether nonthermal (i.e., not dependent on a change in temperature) effects exist. This is a well-discussed area in the scientific literature and not the focus of this paper but we would like to mention it briefly because it has implications for public safety near transmission facilities.

Practically, we do not actually need to know whether RFR effects are thermal or nonthermal to set exposure guidelines. Most of the biological-effects studies of RFR that have been conducted since the 1980s were under nonthermal conditions. In studies using isolated cells, the ambient temperature during exposure was generally well controlled. In most animal studies, the RFR intensity used usually did not cause a significant increase in body temperature in the test animals. Most scientists consider nonthermal effects as established, even though the implications are not fully understood.

Scientifically, there are three rationales for the existence of nonthermal effects:

- 1. Effects can occur at low intensities when a significant increase in temperature is not likely.
- 2. Heating does not produce the same effects as RFR expo-
- RFR with different modulations and characteristics produce different effects even though they may produce the same pattern of SAR distribution and tissue heating.

Low-intensityeffects have been discussed previously (see Section 7.). There are reports that RFR triggers effects that are different from an increase in temperature, e.g., Wachtel et al. (1975); Seaman and Wachtel (1978); D'Inzeo et al. (1988). And studies showing that RFR of the same frequency and intensity, but with different modulations and waveforms, can produce different effects as seen in the work of Baranski (1972); Arber and Lin (1985); Campisi et al. (2010); d'Ambrosio et al. (2002); Frey et al. (1975); Oscar and Hawkins (1977); Sanders et al. (1985); Huber et al. (2002); Markkanen et al. (2004); Hung et al. (2007); and Luukkonen et al. (2009).

A counter-argument for point 1 is that RFR can cause micro-heating at a small location even though there is no measurement change in temperature over the whole sample. This implies that an effect observed at low intensities could be due to localized micro-heating, and, therefore, is still considered thermal. However, the micro-heating theory could not apply to test subjects that are not stationary, such as in the case of Magras and Xenos (1997) who reported that mice exposed to low-intensity RFR became less repro-

ductive over several generations. "Hot spots" of heating move within the body when the subject moves in the field and, thus, cannot maintain sustained heating of certain tissue.

The counter argument for point 2 is that heating by other means does not produce the same pattern of energy distribution as RFR. Thus, different effects would result. Again, this counter argument does not work on moving objects. Thus, results supporting the third point are the most compelling.

10. Studies on exposure to cell tower transmissions

From the early genesis of cell phone technology in the early 1980s, cell towers were presumed safe when located near populated areas because they are low-power installations in comparison with broadcast towers. This thinking already depended on the assumption that broadcast towers were safe if kept below certain limits. Therefore, the reasoning went, cell towers would be safer still. The thinking also assumed that exposures between cell and broadcast towers were comparable. In certain cities, cell and broadcast tower transmissions both contributed significantly to the ambient levels of RFR (Sirav and Seyhan 2009; Joseph et al. 2010).

There are several fallacies in this thinking, including the fact that broadcast exposures have been found unsafe even at regulated thresholds. Adverse effects have been noted for significant increases for all cancers in both men and women living near broadcast towers (Henderson and Anderson 1986); childhood leukemia clusters (Maskarinec et al. 1994; Ha et al. 2003; Park et al. 2004); adult leukemia and lymphoma clusters, and elevated rates of mental illness (Hocking et al. 1996; Michelozzi et al. 2002; Ha et al. 2007); elevated brain tumor incidence (Dolk et al. 1997a, 1997b); sleep disorders, decreased concentration, anxiety, elevated blood pressure, headaches, memory impairment, increased white cell counts, and decreased lung function in children (Altpeter et al. 2000); motor, memory, and learning impairment in children (Kolodynski and Kolodynski 1996), nonlinear increases in brain tumor incidence (Colorado Department of Public Health 2004); increases in malignant melanoma (Hallberg and Johansson 2002); and nonlinear immune system changes in women (Boscol et al. 2001). (The term "nonlinear" is used in scientific literature to mean that an effect was not directly proportional to the intensity of exposure. In the case of the two studies mentioned previously, adverse effects were found at significant distances from the towers, not in closer proximity where the power density exposures were higher and therefore presumed to have a greater chance of causing effects. This is something that often comes up in low-level energy studies and adds credence to the argument that low-level exposures could cause qualitatively different effects than higher level exposures.)

There is also anecdotal evidence in Europe that some communities have experienced adverse physical reactions after the switch from analog TV broadcast signals to the new digital formats, which can be more biologically complex

Three doctors in Germany, Cornelia Waldmann-Selsam, MD, Christine Aschermann, MD, and Markus Kern, MD,

wrote (in a letter to the U.S. President, entitled Warning -Adverse Health Effects From Digital Broadcast Television)10, that on 20 May 2006, two digital broadcast television stations went on the air in the Hessian Rhoen area. Prior to that time that area had low radiation levels, which included that from cell phone towers of which there were few. However, coinciding with the introduction of the digital signals, within a radius of more than 20 km, there was an abrupt onset of symptoms for constant headaches, pressure in the head, drowsiness, sleep problems, inability to think clearly, forgetfulness, nervousness, irritability, tightness in the chest, rapid heartbeat, shortness of breath, depression, apathy, loss of empathy, burning skin, sense of inner burning, leg weakness, pain in the limbs, stabbing pain in various organs, and weight gain. They also noted that birds fled the area. The same symptoms gradually appeared in other locations after digital signals were introduced. Some physicians accompanied affected people to areas where there was no TV reception from terrestrial sources, such as in valleys or behind mountain ranges, and observed that many people became symptom free after only a short time. The digital systems also require more transmitters than the older analog systems and, therefore, somewhat higher exposure levels to the general population are expected, according to the 2009 SCENIHR Report (SCENIHR 2009).

Whether digital or analog, the frequencies differ between broadcast and cell antennas and do not couple with the human anatomy in whole-body or organ-specific models in the same ways (NCRP 1986; ICNIRP 1998). This difference in how the body absorbs energy is the reason that all standards-setting organizations have the strictest limitations between 30–300 MHz — ranges that encompass FM broadcast where whole body resonance occurs (Cleveland 2001). Exposure allowances are more lenient for cell technology in frequency ranges between 300 MHz and 3 GHz, which encompass cellular phone technology. This is based on the assumption that the cell frequencies do not penetrate the body as deeply and no whole-body resonance can occur.

There are some studies on the health effects on people living near cell phone towers. Though cell technology has been in existence since the late 1980s, the first study of populations near cell tower base stations was only conducted by Santini et al. (2002). It was prompted in part by complaints of adverse effects experienced by residents living near cell base stations throughout the world and increased activism by citizens. As well, increasing concerns by physicians to understand those complaints was reflected in professional organizations like the ICEMS (International Committee on Electromagnetic Safety) Catania Resolution¹¹, the Irish Doctors Environmental Association (IDEA)¹², and the Freiburger Appeal¹³.

Santini conducted a survey study of 530 people (270 men, 260 women) on 18 nonspecific health symptoms (NSHS) in relation to self-reported distance from towers of <10 m, 10 to 50 m, 50 to 100 m, 100 to 200 m, 200 to 300 m, and >300 m. The control group compared people living more

than 300 m (approximately 1000 ft) or not exposed to base stations. They controlled for age, presence of electrical transformers (<10 m), high tension lines (<100 m), and radio/TV broadcast transmitters (<4 km), the frequency of cell phone use (>20 min per day), and computer use (>2 h per day). Questions also included residents' location in relation to antennas, taking into account orientations that were facing, beside, behind, or beneath antennas in cases of roof-mounted antenna arrays. Exposure conditions were defined by the length of time living in the neighborhood (<1 year through >5 years); the number of days per week and hours per day (<1 h to >16 h) that were spent in the residence.

Results indicated increased symptoms and complaints the closer a person lived to a tower. At <10 m, symptoms included nausea, loss of appetite, visual disruptions, and difficulty in moving. Significant differences were observed up through 100 m for irritability, depressive tendencies, concentration difficulties, memory loss, dizziness, and lower libido. Between 100 and 200 m, symptoms included headaches, sleep disruption, feelings of discomfort, and skin problems. Beyond 200 m, fatigue was significantly reported more often than in controls. Women significantly reported symptoms more often than men, except for libido loss. There was no increase in premature menopause in women in relation to distance from towers. The authors concluded that there were different sex-dependent sensitivities to electromagnetic fields. They also called for infrastructure not to be sited <300 m (~1000 ft) from populations for precautionary purposes, and noted that the information their survey captured might not apply to all circumstances since actual exposures depend on the volume of calls being generated from any particular tower, as well as on how radiowaves are reflected by environmental factors.

Similar results were found in Egypt by Abdel-Rassoul et al. (2007) looking to identify neurobehavioral deficits in people living near cell phone base stations. Researchers conducted a cross-sectional study of 85 subjects: 37 living inside a building where antennas were mounted on the rooftop and 48 agricultural directorate employees who worked in a building (~10 m) opposite the station. A control group of 80 who did not live near base stations were matched for age, sex, occupation, smoking, cell phone use, and educational level. All participants completed a questionnaire containing personal, educational, and medical histories; general and neurological examinations; a neurobehavioral test battery (NBTB) involving tests for visuomotor speed, problem solving, attention, and memory, in addition to a Eysenck personality questionnaire (EPQ).

Their results found a prevalence of neuropsychiatric complaints: headaches, memory changes, dizziness, tremors, depressive symptoms, and sleep disturbance were significantly higher among exposed inhabitants than controls. The NBTB indicated that the exposed inhabitants exhibited a significantly lower performance than controls in one of the tests of attention and short-term auditory memory (paced auditory

¹⁰ http://www.notanotherconspiracy.com/2009/02/warning-adverse-health-effects-from.html. (Accessed October 2010.)

¹¹ http://www.icems.eu/resolution.htm

¹² http://www.ideeaireland.org/emr.htm

¹³ http://www.laleva.cc/environment/freiburger_appeal.html

serial addition test (PASAT)). Also, the inhabitants opposite the station exhibited a lower performance in the problem-solving test (block design) than those who lived under the station. All inhabitants exhibited a better performance in the two tests of visuomotor speed (digit symbol and Trailmaking B) and one test of attention (Trailmaking A) than controls

Environmental power-density data were taken from measurements of that building done by the National Telecommunications Institute in 2000. Measurements were collected from the rooftop where the antennas were positioned, the shelter that enclosed the electrical equipment and cables for the antennas, other sites on the roof, and within an apartment below one of the antennas. Power-density measurements ranged from 0.1-6.7 µW/cm². No measurements were taken in the building across the street. The researchers noted that the last available measurements of RFR in 2002 in that area were less than the allowable standards but also noted that exposures depended on the number of calls being made at any given time, and that the number of cell phone users had increased approximately four times within the 2 years just before the beginning of their study in 2003. They concluded that inhabitants living near mobile phone base stations are at risk for developing neuropsychiatric problems, as well as some changes in the performance of neurobehavioral functions, either by facilitation (over-stimulation) or inhibition (suppression). They recommended the standards be revised for public exposure to RFR, and called for using the NBTB for regular assessment and early detection of biological effects among inhabitants near base stations (Abdel-Rassoul et al. 2007).

Hutter et al. (2006) sought to determine cognitive changes, sleep quality, and overall well-being in 365 rural and urban inhabitants who had lived for more than a year near 10 selected cell phone base stations. Distance from antennas was 24 to 600 m in rural areas, and 20 to 250 m in the urban areas. Field strength measurements were taken in bedrooms and cognitive tests were performed. Exposure to high-frequency EMFs was lower than guidelines and ranged from 0.000002 to 0.14 µW/cm² for all frequencies between 80 MHz and 2 GHz with the greater exposure coming from mobile telecommunications facilities, which was between 0.000001 and 0.14 µW/cm². Maximum levels were between 0.000002 and 0.41 µW/cm² with an overall 5% of the estimated maximum above 0.1 µW/cm². Average levels were slightly higher in rural areas (0.005 µW/cm²) than in urban areas (0.002 µW/cm²). The researchers tried to ascertain if the subjective rating of negative health consequences from base stations acted as a covariable but found that most subjects expressed no strong concerns about adverse effects from the stations, with 65% and 61% in urban and rural areas, respectively, stating no concerns at all. But symptoms were generally higher for subjects who expressed health concerns regarding the towers. The researchers speculated that this was due to the subjects with health complaints seeking answers and consequently blaming the base station; or that subjects with concerns were more anxious in general and tended to give more negative appraisals of their body

functions; and the fact that some people simply give very negative answers.

Hutter's results were similar to those of Santini et al. (2002) and Abdel-Rassoul et al. (2007). Hutter found a significant relationship between symptoms and power densities. Adverse effects were highest for headaches, cold hands and feet, cardiovascular symptoms, and concentration difficulties. Perceptual speed increased while accuracy decreased insignificantly with increasing exposure levels. Unlike the others, however, Hutter found no significant effects on sleep quality and attributed such problems more to fear of adverse effects than actual exposure. They concluded that effects on well-being and performance cannot be ruled out even as mechanisms of action remain unknown. They further recommended that antenna siting should be done to minimize exposure to the population.

Navarro et al. (2003) measured the broadband electric field (E-field) in the bedrooms of 97 participants in La Nora, Murcia, Spain and found a significantly higher symptom score in 9 out of 16 symptoms in the groups with an exposure of 0.65 V/m (0.1121 µW/cm²) compared with the control group with an exposure below 0.2 V/m (0.01061 µW/cm²), both as an average. The highest contributor to the exposure was GSM 900/1800 MHz signals from mobile telecommunications. The same researchers also reported significant correlation coefficients between the measured E-field and 14 out of 16 health-related symptoms with the five highest associations found for depressive tendencies, fatigue, sleeping disorders, concentration difficulties, and cardiovascular problems. In a follow up work, Oberfeld et al. (2004) conducted a health survey in Spain in the vicinity of two GSM 900/1800 MHz cell phone base stations, measuring the E-field in six bedrooms, and found similar results. They concluded that the symptoms are in line with "microwave syndrome" reported in the literature (Johnson-Liakouris 1998). They recommended that the sum total for ambient exposures should not be higher than 0.02 V/m the equivalent of a power density of 0.00011 µW/cm², which is the indoor exposure value for GSM base stations proposed by the Public Health Office of the Government of Salzburg, Austria in 2002¹⁴.

Eger et al. (2004) took up a challenge to medical professionals by Germany's radiation protection board to determine if there was an increased cancer incidence in populations living near cell towers. Their study evaluated data for approximately 1000 patients between the years of 1994 and 2004 who lived close to cell antennas. The results showed that the incidence of cancer was significantly higher among those patients who had lived for 5 to 10 years at a distance of up to 400 m from a cell installation that had been in operation since 1993, compared with those patients living further away, and that the patients fell ill on an average of 8 years earlier than would be expected. In the years between 1999 and 2004, after 5 years operation of the transmitting installation, the relative risk of getting cancer had tripled for residents in proximity of the installation compared with inhabitants outside of the area.

Wolf and Wolf (2004) investigated increased cancer incidence in populations living in a small area in Israel exposed

¹⁴ http://www.salzburg.gv.at/umweltmedizin. (Accessed October 2010.)

to RFR from a cell tower. The antennas were mounted 10 m high, transmitting at 850 MHz and 1500 W at full-power output. People lived within a 350 m half circle of the antennas. An epidemiologic assessment was done to determine whether the incidence of cancer cases among individuals exposed to the base station in the south section of the city of Netanya called Irus (designated area A) differed from expected cancer rates throughout Israel, and in the town of Netanya in general, as compared with people who lived in a nearby area without a cell tower (designated area B). There were 622 participants in area A who had lived near the cell tower for 3 to 7 years and were patients at one health clinic. The exposure began 1 year before the start of the study when the station first came into service. A second cohort of individuals in area B, with 1222 participants who received medical services at a different clinic located nearby, was used as a control. Area B was closely matched for environment, workplace, and occupational characteristics. In exposure area A, eight cases of different types of cancer were diagnosed in a period of 1 year, including cancers of the ovary (1), breast (3), Hodgkins lymphoma (1), lung (1), osteoid osteoma (1), and hypernephroma (1). The RFR field measurements were also taken per house and matched to the cancer incidents. The rate of cancers in area A was compared with the annual rate of the general population (31 cases per 10000) and to incidence for the entire town of Netanya. There were two cancers in area B, compared to eight in area A. They also examined the history of the exposed cohort (area A) for malignancies in the 5 years before exposure began and found only two cases in comparison to eight cases 1 year after the tower went into service. The researchers concluded that relative cancer rates for females were 10.5 for area A, 0.6 for area B, and 1.0 for the whole town of Netanya. Cancer incidence in women in area A was thus significantly higher (p < 0.0001) compared with that of area B and the whole city. A comparison of the relative risk revealed that there were 4.15 times more cases in area A than in the entire population. The study indicated an association between increased incidence of cancer and living in proximity to a cell phone base station. The measured level of RFR, between 0.3 to 0.5 µW/cm², was far below the thermal guidelines.

11. Risk perception, electrohypersensitivity, and psychological factors

Others have followed up on what role risk perception might play in populations near cell base stations to see if it is associated with health complaints.

Blettner et al. (2008) conducted a cross-sectional, multiphase study in Germany. In the initial phase, 30 047 people out of a total of 51 444, who took part in a nationwide survey, were also asked about their health and attitudes towards mobile phone base stations. A list of 38 potential health complaints were used. With a response rate of 58.6%, 18.0% were concerned about adverse health effects from base stations, 10.3% directly attributed personal adverse effects to them. It was found that people living within 500 m, or those concerned about personal exposures, reported more health complaints than others. The authors concluded that even though a substantial proportion of the German popula-

tion is concerned about such exposures, the observed higher health complaints cannot be attributed to those concerns alone.

Kristiansen et al. (2009) also explored the prevalence and nature of concerns about mobile phone radiation, especially since the introduction of new 3G-UMTS (universal mobile telecommunications system) networks that require many more towers and antennas have sparked debate throughout Europe. Some local governments have prohibited mobile antennas on public buildings due to concerns about cancer, especially brain cancer in children and impaired psychomotor functions. One aim of the researchers was risk assessment to compare people's perceptions of risk from cell phones and masts to other fears, such as being struck by lightening. In Denmark, they used data from a 2006 telephone survey of 1004 people aged 15+ years. They found that 28% of the respondents were concerned about exposure to mobile phone radiation and 15% about radiation from masts. In contrast, 82% of respondents were concerned about other forms of environmental pollution. Nearly half of the respondents considered the mortality risk of 3G phones and masts to be of the same order of magnitude as being struck by lightning (0.1 fatalities per million people per year), while 7% thought it was equivalent to tobacco-induced lung cancer (approximately 500 fatalities per million per year). Among women, concerns about mobile phone radiation, perceived mobile phone mortality risk, and concerns about unknown consequences of new technologies, increased with educational levels. More than two thirds of the respondents felt that they had not received adequate public information about the 3G system. The results of the study indicated that the majority of the survey population had little concern about mobile phone radiation, while a minority is very concerned.

Augner et al. (2009) examined the effects of short-term GSM base station exposure on psychological symptoms including good mood, alertness, and calmness as measured by a standardized well-being questionnaire. Fifty-seven participants were randomly assigned to one of three different exposure scenarios. Each of those scenarios subjected participants to five 50 min exposure sessions, with only the first four relevant for the study of psychological symptoms. Three exposure levels were created by shielding devices, which could be installed or removed between sessions to create double-blinded conditions. The overall median power densities were 0.00052 µW/cm² during low exposures, 0.0154 µW/cm2 during medium exposures, and 0.2127 µW/cm² during high-exposure sessions. Participants in high- and medium-exposure scenarios were significantly calmer during those sessions than participants in low-exposure scenarios throughout. However, no significant differences between exposure scenarios in the "good mood" or "alertness" factors were found. The researchers concluded that short-term exposure to GSM base station signals may have an impact on well-being by reducing psychological arousal.

Eltiti et al. (2007) looked into exposures to the GSM and UMTS exposures from base stations and the effects to 56 participants who were self-reported as sensitive to electromagnetic fields. Some call it electro-hypersensitivity (EHS) or just electrosensitivity. People with EHS report that they suffer negative health effects when exposed to electro-

magnetic fields from everyday objects such as cell phones, mobile phone base stations, and many other common things in modern societies. EHS is a recognized functional impairment in Sweden. This study used both open provocation and double-blind tests to determine if electrosensitive and control individuals experienced more negative health effects when exposed to base-station-like signals compared with sham exposures. Fifty-six electrosensitive and 120 control participants were tested first in an open provocation test. Of these, 12 electrosensitive and six controls withdrew after the first session. Some of the electrosensitive subjects later issued a statement saying that the initial exposures made them too uncomfortable to continue participating in the study. This means that the study may have lost its most vulnerable test subjects right at the beginning, possibly skewing later outcomes. The remainder completed a series of doubleblind tests. Subjective measures of well-being and symptoms, as well as physiological measures of blood-volume pulse, heart rate, and skin conductance were obtained. They found that during the open provocation, electrosensitive individuals reported lower levels of well-being to both GSM and UMTS signals compared with sham exposure, whereas controls reported more symptoms during the UMTS exposure. During double-blind tests the GSM signal did not have any effect on either group. Electrosensitive participants did report elevated levels of arousal during the UMTS condition, but the number or severity of symptoms experienced did not increase. Physiological measures did not differ across the three exposure conditions for either group. The researchers concluded that short-term exposure to a typical GSM basestation-like signal did not affect well-being or physiological functions in electrosensitive or control individuals even though the electrosensitive individuals reported elevated levels of arousal when exposed to a UMTS signal. The researchers stated that this difference was likely due to the effect of the order of the exposures throughout the series rather than to the exposure itself. The researchers do not speculate about possible data bias when one quarter of the most sensitive test subjects dropped out at the beginning.

In follow-up work, Eltiti et al. (2009) attempted to clarify some of the inconsistencies in the research with people who report sensitivity to electromagnetic fields. Such individuals, they noted, often report cognitive impairments that they believe are due to exposure to mobile phone technology. They further said that previous research in this area has revealed mixed results, with the majority of research only testing control individuals. Their aim was to clarify whether shortterm (50 min) exposure at 1 µW/cm² to typical GSM and UMTS base station signals affects attention, memory, and physiological endpoints in electrosensitive and control participants. Data from 44 electrosensitive and 44 matched-control participants who performed the digit symbol substitution task (DSST), digit span task (DS), and a mental arithmetic task (MA), while being exposed to GSM, UMTS, and sham signals under double-blind conditions were analyzed. Overall, the researchers concluded that cognitive functioning was not affected by short-term exposure to either GSM or UMTS signals. Nor did exposure affect the physiological measurements of blood-volume pulse, heart rate, and skin conductance that were taken while participants performed the cognitive tasks. The GSM signal was a combined signal of

900 and 1800 MHz frequencies, each with a power flux density of 0.5 µW/cm², which resulted in combined power flux density of 1 µW/cm² over the area where test subjects were seated. Previous measurements in 2002 by the National Radiological Protection Board in the UK, measuring power density from base stations at 17 sites and 118 locations (Mann et al. 2002), found that in general, the power flux density was between 0.001 µW/cm² to 0.1 µW/cm², with the highest power density being 0.83 µW/cm². The higher exposure used by the researchers in this study was deemed comparable by them to the maximum exposure a person would encounter in the real world. But many electrosensitive individuals report that they react to much lower exposures too. Overall, the electrosensitive participants had a significantly higher level of mean skin conductance than control subjects while performing cognitive tasks. The researchers noted that this was consistent with other studies that hypothesize sensitive individuals may have a general imbalance in autonomic nervous system regulation. Generally, cognitive functioning was not affected in either electrosensitives or controls. When Bonferroni corrections were applied to the data, the effects on mean skin conductance disappeared. A criticism is that this averaging of test results hides more subtle effects.

Wallace et al. (2010) also tried to determine if short-term exposure to RFR had an impact on well-being and what role, if any, psychological factors play. Their study focused on "Airwave", a new communication system being rolled out across the UK for police and emergency services. Some police officers have complained about skin rashes, nausea, headaches, and depression as a consequence of using Airwave two-way radio handsets. The researchers used a small group of self-reported electrosensitive people to determine if they reacted to the exposures, and to determine if exposures to specific signals affect a selection of the adult population who do not report sensitivity to electromagnetic fields. A randomized double-blind provocation study was conducted to establish whether short-term exposure to a terrestrial trunked radio (TETRA) base station signal has an impact on health and well-being in individuals with electrosensitivity and controls. Fifty-one individuals with electrosensitivity and 132 age- and gender-matched controls participated first in an open provocation test, while 48 electrosensitive and 132 control participants went on to complete double-blind tests in a fully screened semi-anechoic chamber. Heart rate, skin conductance, and blood pressure readings provided objective indices of short-term physiological response. Visual analogue scales and symptom scales provided subjective indices of well-being. Their results found no differences on any measure between TETRA and sham (no signal) under double-blind conditions for either control or electrosensitive participants and neither group could detect the presence of a TETRA signal above chance (50%). The researchers noted, however, that when conditions were not double-blinded, the electrosensitive individuals did report feeling worse and experienced more severe symptoms during TETRA compared with sham exposure. They concluded that the adverse symptoms experienced by electrosensitive individuals are caused by the belief of harm from TETRA base stations rather than because of the low-level EMF exposure itself.

It is interesting to note that the three previously men-

tioned studies were all conducted at the same Electromagnetics and Health Laboratory at the University of Essex, Essex, UK, by the same relative group of investigators. Those claiming to be electrosensitive are a small subgroup in the population, often in touch through Internet support groups. In the first test, many electrosensitives dropped out because they found the exposures used in the study too uncomfortable. The drop-out rate decreased with the subsequent studies, which raises the question of whether the electrosensitive participants in the latter studies were truly electrosensitive. There is a possibility that a true subgroup of electrosensitives cannot tolerate such study conditions, or that potential test subjects are networking in a way that preclude their participation in the first place. In fact, researchers were not able to recruit their target numbers for electrosensitive participants in any of the studies. The researchers also do not state if there were any of the same electrosensitive participants used in the three studies. Nor do they offer comment regarding the order of the test methods possibly skewing results.

Because of uncertainty regarding whether EMF exposures are actually causing the symptoms that electrosensitives report, and since many electrosensitives also report sensitivities to myriad chemicals and other environmental factors, it has been recommended (Hansson Mild et al. 2006) that a new term be used to describe such individuals — idiopathic environmental intolerance with attribution to electromagnetic fields (IEI-EMF).

Furubayashi et al. (2009) also tried to determine if people who reported symptoms to mobile phones are more susceptible than control subjects to the effect of EMF emitted from base stations. They conducted a double-blind, cross-over provocation study, sent questionnaires to 5000 women and obtained 2472 valid responses from possible candidates. From those, they were only able to recruit 11 subjects with mobile phone related symptoms (MPRS) and 43 controls. The assumption was that individuals with MPRS matched the description of electrosensitivity by the World Health Organization (WHO). There were four EMF exposure conditions, each of which lasted 30 min: (i) continuous, (ii) intermittent, (iii) sham exposure with noise, and (iv) sham exposure without noise. Subjects were exposed to EMF of 2.14 GHz, 10 V/m (26.53 µW/cm²) wideband code division multiple access (W-CDMA), in a shielded room to simulate whole-body exposure to EMF from base stations, although the exposure strength they used was higher than that commonly received from base stations. The researchers measured several psychological and cognitive parameters immediately before and after exposure, and monitored autonomic functions. Subjects were asked to report on their perception of EMF and level of discomfort during the experiment. The MPRS group did not differ from the controls in their ability to detect exposure to EMF. They did, however, consistently experience more discomfort in general, regardless of whether or not they were actually exposed to EMF, and despite the lack of significant changes in their autonomic functions. The researchers noted that others had found electrosensitive subjects to be more susceptible to stress imposed by task performance, although they did not differ from normal controls in their personality traits. The researchers concluded that the two groups did not differ in

their responses to real or sham EMF exposure according to any psychological, cognitive or autonomic assessment. They said they found no evidence of any causal link between hypersensitivity symptoms and exposure to EMF from base stations. However, this study, had few MPRS participants.

Regel et al. (2006) also investigated the effects of the influence of UMTS base-station-like signals on well-being and cognitive performance in subjects with and without self-reported sensitivity to RFR. The researchers performed a controlled exposure experiment in a randomized, doubleblind crossover study, with 45 min at an electric field strength of 0 V/m, 1.0 V/m (0.2653 µW/cm²), or 10.0 V/m (26.53 µW/cm²), incident with a polarization of 45° from the left-rear side of the subject, at weekly intervals. A total of 117 healthy subjects that included 33 self-reported sensitive subjects and 84 nonsensitive subjects, participated in the study. The team assessed well-being, perceived field strength, and cognitive performance with questionnaires and cognitive tasks and conducted statistical analyses using linear mixed models. Organ-specific and brain-tissue-specific dosimetry, including uncertainty and variation analysis, was performed. Their results found that in both groups, wellbeing and perceived field strength were not associated with actual exposure levels. They observed no consistent condition-induced changes in cognitive performance except for two marginal effects. At 10 V/m (26.53 µW/cm²) they observed a slight effect on speed in one of six tasks in the sensitive subjects and an effect on accuracy in another task in nonsensitive subjects. Both effects disappeared after multiple endpoint adjustments. They concluded that they could not confirm a short-term effect of UMTS base-station-like exposure on well-being. The reported effects on brain functioning were marginal, which they attributed to chance. Peak spatial absorption in brain tissue was considerably smaller than during use of a mobile phone. They concluded that no conclusions could be drawn regarding short-term effects of cell phone exposure or the effects of long-term base-stationlike exposures on human health.

Siegrist et al. (2005) investigated risk perceptions associated with mobile phones, base stations, and other sources of EMFs through a telephone survey conducted in Switzerland. Participants assessed both risks and benefits associated with nine different sources of EMF. Trust in the authorities regulating these hazards was also assessed. Participants answered a set of questions related to attitudes toward EMF and toward mobile phone base stations. Their results were: highvoltage transmission lines are perceived as the most risky source of EMF; and mobile phones and base stations received lower risk ratings. Trust in authorities was positively associated with perceived benefits and negatively associated with perceived risks. Also, people who use their mobile phones frequently perceived lower risks and higher benefits than people who use their mobile phones infrequently. People who believed they lived close to a base station did not significantly differ in their perceived level of risks associated with mobile phone base stations from people who did not believe they lived close to a base station. A majority of participants favored limits to exposures based on worst-case scenarios. The researchers also correlated perceived risks with other beliefs and found that belief in paranormal phenomena is related to level of perceived risks associated with EMF. In addition, people who believed that most chemical substances cause cancer also worried more about EMF than people who did not believe that chemical substances are harmful. This study found the obvious — that some people worry more about environmental factors than others across a range of concerns.

Wilen et al. (2006) investigated the effects of exposure to mobile phone RFR on people who experience subjective symptoms when using mobile phones. Twenty subjects with MPRS were matched with 20 controls without MPRS. Each subject participated in two experimental sessions, one with true exposure and one with sham exposure, in random order. In the true exposure condition, the test subjects were exposed for 30 min to an RFR field generating a maximum SAR (1 g) in the head of 1 W/kg through an indoor base station antenna attached to signals from a 900 MHz GSM mobile phone. Physiological and cognitive parameters were measured during the experiment for heart rate and heart rate variability (HRV), respiration, local blood flow, electrodermal activity, critical flicker fusion threshold (CFFT), shortterm memory, and reaction time. No significant differences related to RFR exposure conditions and no differences in baseline data were found between subject groups with the exception for reaction time, which was significantly longer among the test subjects than among the controls the first time the test was performed. This difference disappeared when the test was repeated. However, the test subjects differed significantly from the controls with respect to HRV as measured in the frequency domain. The test subjects displayed a shift in the low/high frequency ratio towards a sympathetic dominance in the autonomous nervous system during the CFFT and memory tests, regardless of exposure condition. They interpreted this as a sign of differences in the autonomous nervous system regulation among persons with MPRS and persons with no such symptoms.

12. Assessing exposures

Quantifying, qualifying, and measuring radiofrequency (RF) energy both indoors and outdoors has frustrated scientists, researchers, regulators, and citizens alike. The questions involve how best to capture actual exposure data—through epidemiology, computer estimates, self-reporting, or actual dosimetry measurements. Determining how best to do this is more important than ever, given the increasing background levels of RFR. Distance from a generating source has traditionally been used as a surrogate for probable power density but that is imperfect at best, given how RF energy behaves once it is transmitted. Complicated factors and numerous variables come into play. The wearing of personal dosimetry devices appears to be a promising area for capturing cumulative exposure data.

Neubauer et al. (2007) asked the question if epidemiology studies are even possible now, given the increasing deployment of wireless technologies. They examined the methodological challenges and used experts in engineering, dosimetry, and epidemiology to critically evaluate dosimetric concepts and specific aspects of exposure assessment regarding epidemiological study outcomes. They concluded that, at least in theory, epidemiology studies near base stations are feasible but that all relevant RF sources have to be

taken into account. They called for pilot studies to validate exposure assessments and recommended that short-to-medium term effects on health and well-being are best investigated by cohort studies. They also said that for long-term effects, groups with high exposures need to be identified first, and that for immediate effects, human laboratory studies are the preferred approach. In other words, multiple approaches are required. They did not make specific recommendations on how to quantify long-term, low-level effects on health and well-being.

Radon et al. (2006) compared personal RF dosimetry measurements against recall to ascertain the reliability of self-reporting near base stations. Their aim was to test the feasibility and reliability of personal dosimetry devices. They used a 24 h assessment on 42 children, 57 adolescents, and 64 adults who wore a Maschek dosimeter prototype, then compared the self-reported exposures with the measurements. They also compared the readings of Maschek prototype with those of the Antennessa DSP-090 in 40 test subjects. They found that self-reported exposures did not correlate with actual readings. The two dosimeters were in moderate agreement. Their conclusion was that personal dosimetry, or the wearing of measuring devices, was a feasible method in epidemiology studies.

A study by Frei et al. (2009) also used personal dosimetry devices to examine the total exposure levels of RFR in the Swiss urban population. What they found was startling nearly a third of the test subjects' cumulative exposures were from cell base stations. Prior to this study, exposure from base stations was thought to be insignificant due to their low-power densities and to affect only those living or working in close proximity to the infrastructure. This study showed that the general population moves in and out of these particular fields with more regularity than previously expected. In a sample of 166 volunteers from Basel, Switzerland, who agreed to wear personal exposure meters (called exposimeters), the researchers found that nearly one third of total exposures came from base stations. Participants carried an exposimeter for 1 week (2 separate weeks in 32 participants) and also completed an activity diary. Mean values were calculated using the robust regression on order statistics (ROS) method. Results found a mean weekly exposure to all RFR and (or) EMF sources was $0.013~\mu\text{W/cm}^2$ (range of individual means 0.0014-0.0881 μW/cm²). Exposure was mainly from mobile phone base stations (32.0%), mobile phone handsets (29.1%), and digital enhanced cordless telecommunications (DECT) phones (22.7%). People owning a DECT phone (total mean 0.015 µW/cm²) or mobile phone (0.014 µW/cm²) were exposed more than those not owning a DECT or mobile phone (0.010 µW/cm²). Mean values were highest in trains (0.116 µW/cm²), airports (0.074 µW/cm²), and tramways or buses (0.036 µW/cm²) and were higher during daytime (0.016 μ W/cm²) than nighttime (0.008 μ W/cm²). The Spearman correlation coefficient between mean exposure in the first and second week was 0.61. Another surprising finding of this study contradicted Neubauer et al. (2008) who found that a rough dosimetric estimate of a 24 h exposure from a base station (1-2 V/m) (i.e., 0.2653-1.061 $\mu \tilde{W}/cm^2$) corresponded to approximately 30 min of mobile phone use. But Frei et al. (2009) found, using the exposimeter, that cell phone use was 200 times higher than the average base sta-

tion exposure contribution in self-selected volunteers (0.487 versus 0.002 μW/cm²). This implied that at the belt, backpack, or in close vicinity to the body, the mean base station contribution corresponds to about 7 min of mobile phone use (24 h divided by 200), not 30 min. They concluded that exposure to RFR varied considerably between persons and locations but was fairly consistent for individuals. They noted that cell phones, base stations, and cordless phones were important sources of exposure in urban Switzerland but that people could reduce their exposures by replacing their cordless domestic phones with conventional landlines at home. They determined that it was feasible to combine diary data with personal exposure measurements and that such data was useful in evaluating RFR exposure during daily living, as well as helpful in reducing exposure misclassification in future epidemiology studies.

Viel et al. (2009) also used personal exposure meters (EME SPY 120 made by Satimo and ESM 140 made by Maschek) to characterize actual residential exposure from antennas. Their primary aim was to assess personal exposures, not ambient field strengths. Two hundred randomly selected people were enrolled to wear measurement meters for 24 h and asked to keep a time-location-activity diary. Two exposure metrics for each radiofrequency were then calculated: the proportion of measurements above the detection limit of 0.05 V/m (0.0006631 μ W/cm²) and the maximum electric field strength. Residential addresses were geocoded and distances from each antenna were calculated. They found that much of the time-recorded field strength was below the detection level of 0.05 V/m, with the exception of the FM radio bands, which had a detection threshold of 12.3%. The maximum electric field was always lower than 1.5 V/m (0.5968 µW/cm²). Exposure to GSM and digital cellular system (DCS) frequencies peaked around 280 m in urban areas and 1000 m from antennas in more suburban/ rural areas. A downward trend in exposures was found within a 10 km distance for FM exposures. Conversely, UMTS, TV3, and TV 4 and 5 signals did not vary with distance. The difference in peak exposures for cell frequencies were attributed to microcell antennas being more numerous in urban areas, often mounted a few meters above ground level, whereas macrocell base stations in less urban areas are placed higher (between 15 and 50 m above ground level) to cover distances of several kilometres. They concluded that despite the limiting factors and high variability of RF exposure assessments, in using sound statistical technique they were able to determine that exposures from GSM and DCS cellular base stations actually increase with distance in the near source zone, with a maximum exposure where the main beam intersects the ground. They noted that such information should be available to local authorities and the public regarding the siting of base stations. Their findings coincide with Abdel-Rassoul et al. (2007) who found field strengths to be less in the building directly underneath antennas, with reported health complaints higher in inhabitants of the building across the street.

Amoako et al. (2009) conducted a survey of RFR at public access points close to schools, hospitals, and highly populated areas in Ghana near 50 cell phone base stations. Their primary objective was to measure and analyze field strength levels. Measurements were made using an Anritsu

model MS 2601A spectrum analyzer to determine the electric field level in the 900 and 1800 MHz frequency bands. Using a GPS (global positioning system), various base stations were mapped. Measurements were taken at 1.5 m above ground to maintain line of sight with the RF source. Signals were measured during the day over a 3 h period, at a distance of approximately 300 m. The results indicated that power densities for 900 MHz at public access points varied from as low as 0.000001 µW/cm² to as high as 0.001 µW/cm². At 1800 MHz, the variation of power densities was from 0.000001 to 0.01 µW/cm². There are no specific RFR standards in Ghana. These researchers determined that while their results in most cites were compliant with the ICNIRP standards, levels were still 20 times higher than values typically found in the UK, Australia, and the U.S., especially for Ghana base stations in rural areas with higher power output. They determined that there is a need to reduce RFR levels since an increase in mobile phone usage is

Clearly, predicting actual exposures based on simple distance from antennas using standardized computer formulas is inadequate. Although power density undoubtedly decreases with distance from a generating source, actual exposure metrics can be far more complex, especially in urban areas. Contributing to the complexity is the fact that the narrow vertical spread of the beam creates a low RF field strength at the ground directly below the antenna. As a person moves away or within a particular field, exposures can become complicated, creating peaks and valleys in field strength. Scattering and attenuation alter field strength in relation to building placement and architecture, and local perturbation factors can come into play. Power density levels can be 1 to 100 times lower inside a building, depending on construction materials, and exposures can differ greatly within a building, depending on numerous factors such as orientation toward the generating source and the presence of conductive materials. Exposures can be twice as high in upper floors than in lower floors, as found by Anglesio et al. (2001).

However, although distance from a transmitting source has been shown to be an unreliable determinant for accurate exposure predictions, it is nevertheless useful in some general ways. For instance, it has been shown that radiation levels from a tower with 15 nonbroadcast radio systems will fall off to hypothetical natural background levels at approximately 1500 ft (\sim 500 m) (Rinebold 2001). This would be in general agreement with the lessening of symptoms in people living near cell towers at a distance over 1000 ft (\sim 300 m) found by Santini et al. (2002).

The previously mentioned studies indicate that accuracy in both test design and personal dosimetry measurements are possible in spite of the complexities and that a general safer distance from a cell tower for residences, schools, daycare centers, hospitals, and nursing homes might be ascertained.

13. Discussion

Numerous biological effects do occur after short-term exposures to low-intensity RFR but potential hazardous health effects from such exposures on humans are still not well established, despite increasing evidence as demonstrated throughout this paper. Unfortunately, not enough is known about biological effects from long-term exposures, especially as the effects of long-term exposure can be quite different from those of short-term exposure. It is the long-term, low-intensity exposures that are most common today and increasing significantly from myriad wireless products and services.

People are reporting symptoms near cell towers and in proximity to other RFR-generating sources including consumer products such as wireless computer routers and Wi-Fi systems that appear to be classic "microwave sickness syndrome," also known as "radiofrequency radiation sickness." First identified in the 1950s by Soviet medical researchers, symptoms included headache, fatigue, ocular dysfunction, dizziness, and sleep disorders. In Soviet medicine, clinical manifestations include dermographism, tumors, blood changes, reproductive and cardiovascular abnormalities, depression, irritability, and memory impairment, among others. The Soviet researchers noted that the syndrome is reversible in early stages but is considered lethal over time (Tolgskaya et al. 1973).

Johnson-Liakouris (1998) noted there are both occupational studies conducted between 1953 and 1991 and clinical cases of acute exposure between 1975 and 1993 that offer substantive verification for the syndrome. Yet, U.S. regulatory agencies and standards-setting groups continue to quibble about the existence of microwave sickness because it does not fit neatly into engineering models for power density, even as studies are finding that cell towers are creating the same health complaints in the population. It should be noted that before cellular telecommunications technology, no such infrastructure exposures between 800 MHz and 2 GHz existed this close to so many people. Microwave ovens are the primary consumer product utilizing a high RF intensity, but their use is for very brief periods of time and ovens are shielded to prevent leakage above 1000 µW/cm² - the current FDA standard. In some cases, following the U.S. Telecommunications Act of 1996 preemption of local health considerations in infrastructure siting, antennas have been mounted within mere feet of dwellings. And, on buildings with roof-mounted arrays, exposures can be lateral with top floors of adjacent buildings at close range.

It makes little sense to keep denying health symptoms that are being reported in good faith. Though the prevalence of such exposures is relatively new to a widespread population, we, nevertheless, have a 50 year observation period to draw from. The primary questions now involve specific exposure parameters, not the reality of the complaints or attempts to attribute such complaints to psychosomatic causes, malingering, or beliefs in paranormal phenomenon. That line of argument is insulting to regulators, citizens, and their physicians. Serious mitigation efforts are overdue.

There is early Russian and U.S. documentation of long-term, very low-level exposures causing microwave sickness as contained in *The Johns Hopkins Foreign Service Health Status Study* done in 1978 (Lilienfield et al. 1978; United States Senate 1979). This study contains both clinical information, and clear exposure parameters. Called the Lilienfield study, it was conducted between 1953 and 1976 to determine what, if any, effects there had been to personnel

in the U.S. Embassy in Moscow after it was discovered that the Soviet government had been systematically irradiating the U.S. government compound there.

The symptoms reported were not due to any known tissue heating properties. The power densities were not only very low but the propagation characteristics were remarkably similar to what we have today with cell phone base stations. Lilienfield recorded exposures for continuous-wave, broadband, modulated RFR in the frequency ranges between 0.6 and 9.5 GHz. The exposures were long-term and low-level at 6 to 8 h per day, 5 days per week, with the average length of exposure time per individual between 2 to 4 years. Modulation information contained phase, amplitude, and pulse variations with modulated signals being transmitted for 48 h or less at a time. Radiofrequency power density was between 2 and 28 $\mu \text{W/cm}^2$ — levels comparable to recent studies cited in this paper.

The symptoms that Lilienfield found included four that fit the Soviet description for dermographism - eczema, psoriasis, allergic, and inflammatory reactions. Also found were neurological problems with diseases of peripheral nerves and ganglia in males; reproductive problems in females during pregnancy, childbearing, and the period immediately after delivery (puerperium); tumor increases (malignant in females, benign in males); hematological alterations; and effects on mood and well-being including irritability, depression, loss of appetite, concentration, and eye problems. This description of symptoms in the early literature is nearly identical to the Santini, Abdel-Rassoul, and Narvarro studies cited earlier, as well as the current (though still anecdotal) reports in communities where broadcast facilities have switched from analog to digital signals at power intensities that are remarkably similar. In addition, the symptoms in the older literature are also quite similar to complaints in

Such reports of adverse effects on well-being are occurring worldwide near cell infrastructure and this does not appear to be related to emotional perceptions of risk. Similar symptoms have also been recorded at varying distances from broadcast towers. It is clear that something else is going on in populations exposed to low-level RFR that computer-generated RFR propagation models and obsolete exposure standards, which only protect against acute exposures, do not encompass or understand. With the increase in so many RFR-emitting devices today, as well as the many in the wings that will dramatically increase total exposures to the population from infrastructure alone, it may be time to approach this from a completely different perspective.

It might be more realistic to consider ambient outdoor and indoor RFR exposures in the same way we consider other environmental hazards such as chemicals from building materials that cause sick building syndrome. In considering public health, we should concentrate on aggregate exposures from multiple sources, rather than continuing to focus on individual source points like cell and broadcast base stations. In addition, whole categorically excluded technologies must be included for systems like Wi-Fi, Wi-Max, smart grids, and smart metering as these can greatly increase ambient radiation levels. Only in that way will low-level electromagnetic energy exposures be understood as the broad environmental factor it is. Radiofrequency radiation is a

form of energetic air pollution and it should be controlled as such. Our current predilection to take this one product or service at a time does not encompass what we already know beyond reasonable doubt. Only when aggregate exposures are better understood by consumers will disproportionate resistance to base station siting bring more intelligent debate into the public arena and help create safer infrastructure. That can also benefit the industries trying to satisfy customers who want such services.

Safety to populations living or working near communications infrastructure has not been given the kind of attention it deserves. Aggregate ambient outdoor and indoor exposures should be emphasized by summing up levels from different generating source points in the Radiofrequency radiation should be treated and regulated like radon and toxic chemicals, as aggregate exposures, with appropriate recommendations made to the public including for consumer products that may produce significant RFR levels indoors. When indoor consumer products such as wireless routers, cordless/DECT phones, leaking microwave ovens, wireless speakers, and (or) security systems, etc. are factored in with nearby outdoor transmission infrastructure, indoor levels may rise to exposures that are unsafe. The contradictions in the studies should not be used to paralyze movement toward safer regulation of consumer products, new infrastructure creation, or better tower siting. Enough good science exists regarding long-term low-level exposures — the most prevalent today — to warrant caution.

The present U.S. guidelines for RFR exposure are not up to date. The most recent IEEE and NCRP guidelines used by the U.S. FCC have not taken many pertinent recent studies into consideration because, they argue, the results of many of those studies have not been replicated and thus are not valid for standards setting. That is a specious argument. It implies that someone tried to replicate certain works but failed to do so, indicating the studies in question are unreliable. However, in most cases, no one has tried to exactly replicate the works at all. It must be pointed out that the 4 W/kg SAR threshold based on the de Lorge studies have also not been replicated independently. In addition, effects of long-term exposure, modulation, and other propagation characteristics are not considered. Therefore, the current guidelines are questionable in protecting the public from possible harmful effects of RFR exposure and the U.S. FCC should take steps to update their regulations by taking all recent research into consideration without waiting for replication that may never come because of the scarcity of research funding. The ICNIRP standards are more lenient in key exposures to the population than current U.S. FCC regulations. The U.S. standards should not be "harmonized" toward more lenient allowances. The ICNIRP should become more protective instead. All standards should be biologically based, not dosimetry based as is the case today.

Exposure of the general population to RFR from wireless communication devices and transmission towers should be kept to a minimum and should follow the "As Low As Reasonably Achievable" (ALARA) principle. Some scientists, organizations, and local governments recommend very low exposure levels — so low, in fact, that many wireless industries claim they cannot function without many more antennas in a given area. However, a denser infrastructure may

be impossible to attain because of citizen unwillingness to live in proximity to so many antennas. In general, the lowest regulatory standards currently in place aim to accomplish a maximum exposure of 0.02 V/m, equal to a power density of 0.0001 μ W/cm², which is in line with Salzburg, Austria's indoor exposure value for GSM cell base stations. Other precautionary target levels aim for an outdoor cumulative exposure of 0.1 μ W/cm² for pulsed RF exposures where they affect the general population and an indoor exposure as low as 0.01 μ W/cm² (Sage and Carpenter 2009). In 2007, The BioInitiative Report, A rationale for a biologically based public exposure standard for electromagnetic fields (ELF and RF), also made this recommendation, based on the precautionary principle (Bioinitiative Report 2007).

Citizens and municipalities often ask for firm setbacks from towers to guarantee safety. There are many variables involved with safer tower siting - such as how many providers are co-located, at what frequencies they operate, the tower's height, surrounding topographical characteristics, the presence of metal objects, and others. Hard and fast setbacks are difficult to recommend in all circumstances. Deployment of base stations should be kept as efficient as possible to avoid exposure of the public to unnecessary high levels of RFR. As a general guideline, cell base stations should not be located less than 1500 ft (~500 m) from the population, and at a height of about 150 ft (~50 m). Several of the papers previously cited indicate that symptoms lessen at that distance, despite the many variables involved. However, with new technologies now being added to cell towers such as Wi-Max networks, which add significantly more power density to the environment, setback recommendations can be a very unpredictable reassurance at best. New technology should be developed to reduce the energy required for effective wireless communication.

In addition, regular RFR monitoring of base stations should be considered. Some communities require that ambient background levels be measured at specific distances from proposed tower sites before, and after, towers go online to establish baseline data in case adverse effects in the population are later reported. The establishment of such baselines would help epidemiologists determine what changed in the environment at a specific point in time and help better assess if RFR played a role in health effects. Unfortunately, with so much background RFR today, it is almost impossible to find a clean RFR environment. Pretesting may have become impossible in many places. This will certainly be the case when smart grid technologies create a whole new blanket of low-level RFR, with millions of new transceivers attached to people's homes and appliances, working off of centralized RFR hubs in every neighborhood. That one technology alone has the ability to permanently negate certain baseline data points.

The increasing popularity of wireless technologies makes understanding actual environmental exposures more critical with each passing day. This also includes any potential effects on wildlife. There is a new environmental concept taking form — that of "air as habitat" (Manville 2007) for species such as birds, bats, and insects, in the same way that water is considered habitat for marine life. Until now, air has been considered something "used" but not necessarily "lived in" or critical to the survival of species. How-

ever, when air is considered habitat, RFR is among the potential pollutants with an ability to adversely affect other species. It is a new area of inquiry deserving of immediate funding and research.

References

- Abdel-Rassoul, G., El-Fateh, O.A., Salem, M.A., Micgael, A., Farahat, F., and Salem, E. 2007. Neurobehavioral effects among inhabitants around mobile phone base stations. Neurotoxicology, 28(2): 434–440. doi:10.1016/j.neuro.2006.07.012.
- Altpeter, E., Battaglia, M., Bader, A., Pfluger, D., Minder, C.E., and Abelin, T. 2000. Ten years experience with epidemiological research in the vicinity of short-wave broadcasting area Schwarzenburg; what does the story tell us? *In Proceedings of the International Conference on Cell Tower Siting, Salzburg, Austria.* 7–8 June 2000, *Edited by Gerd Oberfeld, Printing Office, State of Salzburg, Austria, August 2000. pp. 127–132.*
- Amoako, J.K., Fletcher, J.J., and Darko, E.O. 2009. Measurement and analysis of radiofrequency radiations from some mobile phone base stations in Ghana. Radiat. Prot. Dosimetry, 135(4): 256–260. doi:10.1093/rpd/ncp115.
- Anglesio, L., Benedetto, A., Bonino, A., Colla, D., Martire, F., Saudino Fusette, S., and d'Amore, G. 2001. Population exposure to electromagnetic fields generated by radio base stations: evaluation of the urban background by using provisional model and instrumental measurements. Radiat. Prot. Dosimetry, 97: 355–358. PMID:11878419.
- Arber, S.L., and Lin, J.C. 1985. Microwave-induced changes in nerve cells: effects of modulation and temperature. Bioelectromagnetics, 6(3): 257–270. doi:10.1002/bem.2250060306.
- Augner, C., Florian, M., Pauser, G., Oberfeld, G., and Hacker, G.W. 2009. GSM base stations: Short-term effects on well-being. Bioelectromagnetics, 30(1): 73–80. doi:10.1002/bem. 20447.
- Balmori, A. 2010. Mobile phone mast effects on common frog (*Rana temporaria*) tadpoles: the city turned into a laboratory. Electromagn. Biol. Med. **29**(1–2): 31–35. doi:10.3109/15368371003685363.
- Baranski, S. 1972. Histological and histochemical effects of microwave irradiation on the central nervous system of rabbits and guinea pigs. Am. J. Phys. Med. 51: 182–190. PMID:5052845.
- Belyaev, I.Y., Hillert, L., Protopopova, M., Tamm, C., Malmgren, L.O., Persson, B.R., Selivanova, G., and Harms-Ringdahl, M. 2005. 915 MHz microwaves and 50 Hz magnetic field affect chromatin conformation and 53BP1 foci in human lymphocytes from hypersensitive and healthy persons. Bioelectromagnetics, 26(3): 173–184. doi:10.1002/bem.20103.
- Belyaev, I.Y., Markovà, E., Hillert, L., Malmgren, L.O., and Person, B.R. 2009. Microwaves from UMTS/GSM mobile phones induce long-lasting inhibition of 53BP1/gamma-H2AX DNA repair foci in human lymphocytes. Bioelectromagnetics, 30(2): 129–141. doi:10.1002/bem.20445.
- Biointiative Report. 2007. The BioInitiative Report, A rationale for a biologically-based public exposure standard for electromagnetic fields (ELF and RF). Volume 1, page 31–33. Available from, http://www.BioInitiative.org. (accessed October 2010).
- Blackman, C.F., Benane, S.G., Joines, W.T., Hollis, M.A., and House, D.E. 1980. Calcium-ion efflux from brain tissue: powerdensity versus internal field-intensity dependencies at 50 MHz RF radiation. Bioelectromagnetics, 1(3): 277–283. doi:10.1002/ bem.2250010304.
- Blettner, M., Schlehofer, B., Brekenkamp, J., Kowall, B., Schmiedel, S., Reis, U., Potthoff, P., Schüz, J., and Berg-Beckhoff, G.

- 2009. Mobile phone base stations and adverse health effects: phase 1: A population-based cross-sectional study in Germany. Occup. Environ. Med. **66**(2): 118–123. doi:10.1136/oem.2007. 037721.
- Bornkessel, C., Schubert, M., Wuschek, M., and Schmidt, P. 2007. Determiniation of the general public exposure around GSM and UMTS base stations. Radiat. Prot. Dosimetry, **124**(1): 40–47. doi:10.1093/rpd/ncm373.
- Boscol, P., Di Sciascio, M.B., D'Ostilio, S., Del Signore, A., Reale, M., Conti, P., Bavazzano, P., Paganelli, R., and Di Gioacchino, M. 2001. Effects of electromagnetic fields produced by radio and television broadcasting stations on the immune system of women. Sci. Total Environ. 273(1-3): 1-10. doi:10.1016/S0048-9697(01)00815-4.
- Campisi, A., Gulino, M., Acquaviva, R., Bellia, P., Raciti, G., Grasso, R., Musumeci, F., Vanella, A., and Triglia, A. 2010. Reactive oxygen species levels and DNA fragmentation on astrocytes in primary culture after acute exposure to low intensity microwave electromagnetic field. Neurosci. Lett. 473(1): 52-55. doi:10.1016/j.neulet.2010.02.018.
- Capri, M., Scarcella, E., Fumelli, C., Bianchi, E., Salvioli, S., Mesirca, P., Agostini, C., Antolini, A., Schiavoni, A., Castellani, G., Bersani, F., and Franceschi, C. 2004. In vitro exposure of human lymphocytes to 900 MHz CW and GSM modulated radiofrequency: studies of proliferation, apoptosis and mitochondrial membrane potential. Radiat. Res. 162(2): 211–218. doi:10. 1667/RR3209.
- Chiang, H., Yao, G.D., Fang, Q.S., Wang, K.Q., Lu, D.Z., and Zhou, Y.K. 1989. Health effects of environmental electromagnetic fields. J. Bioelectr. 8: 127–131. doi:10.3109/ 15368378909020950.
- Christ, A., Gosselin, M.C., Christopoulou, M., Kuhn, S., and Kuster, N. 2010. Age-dependent tissue-specific exposure of cell phone users. Phys. Med. Biol. 55(7): 1767–1783. doi:10.1088/0031-9155/55/7/001.
- Cleveland, R.F. 2001. Human exposure to radiofrequency electromagnetic fields: FCC guidelines; global standards; evaluating compliance; federal and local jurisdiction. In Cell Towers, Wireless Convenience? or Environmental Hazard? Proceedings of the Cell Towers Forum, State of the Science/State of the Law. Edited by B.B. Levitt. Safe Goods/New Century. pp. 116–128.
- Colorado Department of Public Health and Environment. 2004. Update: tumor incidence in residents adjacent to the Lookout Mountain Antenna Farm 1979–2002, Colorado Department of Public Health and Environment Report, July 2004.
- Cooper, T.G., Mann, S.M., Khalid, M., and Blackwell, R.P. 2006. Public exposure to radio waves near GSM microcell and picocell base stations. J. Radiol. 26: 199–211.
- d'Ambrosio, G., Massa, R., Scarfi, M.R., and Zeni, O. 2002. Cytogenetic damage in human lymphocytes following GMSK phase modulated microwave exposure. Bioelectromagnetics, 23(1): 7–13. doi:10.1002/bem.93.
- D'Andrea, J.A., DeWitt, J.R., Emmerson, R.Y., Bailey, C., Stensaas, S., and Gandhi, O.P. 1986a. Intermittent exposure of rats to 2450 MHz microwaves at 2.5 mW/cm²: behavioral and physiological effects. Bioelectromagnetics, **7**(3): 315–328. doi:10.1002/bem.2250070308.
- D'Andrea, J.A., DeWitt, J.R., Gandhi, O.P., Stensaas, S., Lords, J.L., and Nielson, H.C. 1986b. Behavioral and physiological effects of chronic 2450 MHz microwave irradiation of the rat at 0.5 mW/cm². Bioelectromagnetics, 7(1): 45–56. doi:10.1002/bem.2250070106.
- D'Inzeo, G., Bernardi, P., Eusebi, F., Grassi, F., Tamburello, C., and Zani, B.M. 1988. Microwave effects on acetylcholine-in-

- duced channels in cultured chick myotubes. Bioelectromagnetics, 9(4): 363-372, doi:10.1002/bem.2250090406.
- de Lorge, J.O. 1984. Operant behavior and colonic temperature of Macaca mulatta exposed to radiofrequency fields at and above resonant frequencies. Bioelectromagnetics, 5(2): 233–246. doi:10.1002/bem.2250050211.
- de Lorge, J., and Ezell, C.S. 1980. Observing-responses of rats exposed to 1.28- and 5.62-GHz microwaves. Bioelectromagnetics, 1(2): 183–198. doi:10.1002/bem.2250010208.
- de Pomerai, D.I., Smith, B., Dawe, A., North, K., Smith, T., Archer, D.B., Duce, I.R., Jones, D., and Candido, E.P. 2003. Microwave radiation can alter protein conformation without bulk heating. FEBS Lett. 543(1-3): 93–97. doi:10.1016/S0014-5793(03)00413-7.
- Department of Health and Human Services. 2008. Statistics, wireless substitution: early release of estimates from the National Health Interview Survey. Centers for Disease Control and Prevention, National Center for Health, July-December 2008. Available from http://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless200905.htm [accessed October 2010].
- DeWitt, J.R., D'Andrea, J.A., Emmerson, R.Y., and Gandhi, O.P. 1987. Behavioral effects of chronic exposure to 0.5 mW/cm² of 2450-MHz microwaves. Bioelectromagnetics, 8(2): 149–157. doi:10.1002/bem.2250080205.
- Dolk, H., Shaddick, G., Walls, P., Grundy, C., Thakrar, B., Kleinschmidt, I., and Elliott, P. 1997a. Cancer incidence near radio and television transmitters in Great Britain, Part I. Sulton Coldfield Transmitter. Am. J. Epidemiol. 145: 1–9. PMID: 9440406.
- Dolk, H., Elliott, P., Shaddick, G., Walls, P., and Thakrar, B. 1997b. Cancer incidence near radio and television transmitters in Great Britain, Part II. Am. J. Epidemiol. 145: 10–17. PMID: 8982017.
- Dumansky, J.D., and Shandala, M.G. 1974. The biologic action and hygienic significance of electromagnetic fields of super high and ultra high frequencies in densely populated areas. *In* Biologic Effects and Health Hazards of Microwave Radiation: Proceedings of an International Symposium. *Edited by* P. Czerski, et al. Polish Medical Publishers, Warsaw.
- Dutta, S.K., Subramoniam, A., Ghosh, B., and Parshad, R. 1984. Microwave radiation-induced calcium ion efflux from human neuroblastoma cells in culture. Bioelectromagnetics, 5(1): 71– 78. doi:10.1002/bem.2250050108.
- Dutta, S.K., Ghosh, B., and Blackman, C.F. 1989. Radiofrequency radiation-induced calcium ion efflux enhancement from human and other neuroblastoma cells in culture. Bioelectromagnetics, 10(2): 197–202. doi:10.1002/bem.2250100208.
- Eger, H., Hagen, K.U., Lucas, B., Vogel, P., and Voit, H. 2004. The influence of being physically near to a cell phone transmission mast on the incidence of cancer. Published in Umwelt-Medizin-Gesellschaft 17 April 2004, as: 'Einfluss der räumlichen Nähe von Mobilfunksendeanlagen auf die Krebsinzidenz'. English translation: 8 October 2004, available at http://www.tetrawatch.net/papers/naila.pdf (Accessed October 2010)
- Eltiti, S., Wallace, D., Ridgewell, A., Zougkou, K., Russo, R., Sepulveda, F., Mirshekar-Syahkal, D., Rasor, P., Deeble, R., and Fox, E. 2007. Does short-term exposure to mobile phone base station signals increase symptoms in individuals who report sensitivity to electromagnetic fields? A double-blind randomized provocation study. Environ. Health Perspect. 115(11): 1603–1608. doi:10.1289/ehp.10286.
- Eltiti, S., Wallace, D., Ridgewell, A., Zougkou, K., Russo, R., Sepulveda, F., and Fox, E. 2009. Short-term exposure to mobile phone base station signals does not affect cognitive functioning

- or physiological measures in individuals who report sensitivity to electromagnetic fields and controls. Bioelectromagnetics, **30**(7): 556–563. doi:10.1002/bem.20504.
- Fesenko, E.E., Makar, V.R., Novoselova, E.G., and Sadovnikov, V.B. 1999. Microwaves and cellular immunity. I. Effect of whole body microwave irradiation on tumor necrosis factor production in mouse cells. Bioelectrochem. Bioenerg. 49(1): 29–35. doi:10.1016/S0302-4598(99)00058-6.
- Forgacs, Z., Somosy, Z., Kubinyi, G., Bakos, J., Hudak, A., Surjan, A., and Thuroczy, G. 2006. Effect of whole-body 1800MHz GSM-like microwave exposure on testicular steroidogenesis and histology in mice. Reprod. Toxicol. **22**(1): 111–117. doi:10. 1016/j.reprotox.2005.12.003.
- Frei, P., Mohler, E., Neubauer, G., Theis, G., Bürgi, A., Fröhlich, J., Braun-Fahrländer, C., Bolte, J., Egger, M., and Röösli, M. 2009. Temporal and spatial variability of personal exposure to radio frequency electromagnetic fields. Environ. Res. 109(6): 779–785. doi:10.1016/j.envres.2009.04.015.
- Frey, A.H., Feld, S.R., and Frey, B. 1975. Neural function and behavior: defining the relationship. Ann. N. Y. Acad. Sci. 247(1 Biologic Effe): 433-439. doi:10.1111/j.1749-6632.1975. tb36019.x.
- Furubayashi, T., Ushiyama, A., Terao, Y., Mizuno, Y., Shirasawa, K., Pongpaibool, P., Simba, A.Y., Wake, K., Nishikawa, M., Miyawaki, K., Yasuda, A., Uchiyama, M., Yamashita, H.K., Masuda, H., Hirota, S., Takahashi, M., Okano, T., Inomata-Terada, S., Sokejima, S., Maruyama, E., Watanabe, S., Taki, M., Ohkubo, C., and Ugawa, Y. 2009. Effects of short-term W-CDMA mobile phone base station exposure on women with or without mobile phone related symptoms. Bioelectromagnetics, 30(2): 100–113. doi:10.1002/bem.20446.
- Gage, M.I. 1979. Behavior in rats after exposure to various power densities of 2450 MHz microwaves. Neurobehav. Toxicol. 1: 137-143.
- Gandhi, O., Lazzi, P.G., and Furse, C.M. 1996. Electromagnetic absorption in the head and neck for mobile telephones at 835 and 1900 MHz. IEEE Trans. Microw. Theory Tech. 44(10): 1884–1897. doi:10.1109/22.539947.
- Guler, G., Tomruk, A., Ozgur, E., and Seyhan, N. 2010. The effect of radiofrequency radiation on DNA and lipid damage in nonpregnant and pregnant rabbits and their newborns. Gen. Physiol. Biophys. 29(1): 59–66. doi:10.4149/gpb_2010_01_59.
- Ha, M., Lim, H.J., Cho, S.H., Choi, H.D., and Cho, K.Y. 2003. Incidence of cancer in the vicinity of Korean AM radio transmitters. Arch. Environ. Health, 58(12): 756–762. doi:10.3200/AEOH.58.12.756-762.
- Ha, M., Im, H., Lee, M., Kim, H.J., Kim, B.C., Gimm, Y.M., and Pack, J.K. 2007. Radio-frequency radiation exposure from AM radio transmitters and childhood leukemia and brain cancer. Am. J. Epidemiol. 166(3): 270–279. doi:10.1093/aje/kwm083.
- Hallberg, O., and Johansson, O. 2002. Melanoma incidence and frequency modulation (FM) broadcasting. Arch. Environ. Health, 57(1): 32–40. doi:10.1080/00039890209602914.
- Hansson Mild, K., Repacholi, M., van Deventer, E., and Ravazzani, P. (Editors). 2006. Working Group Report. In Proceedings International Workshop on EMF Hypersensitivity 25–27 October 2004, Prague, Czech Republic. MilanL WHO Press. pp. 15–6. Available from: www.who.int/peh-emf/meetings/hypersensitivity_prague2004/en/index.html. [Accessed May 2007.]
- Henderson, A., and Anderson, B.S. 1986. Cancer incidence in census tracts with broadcast towers in Honolulu, Hawaii. Report prepared by Environmental Epidemiology Program, State of Hawaii, Department of Public Health, 27 October 1986.

- Henderson, S.I., and Bangay, M.J. 2006. Survey of RF exposure levels from mobile telephone base stations in Australia. Bioelectromagnetics, 27(1): 73–76. doi:10.1002/bem.20174.
- Hjollund, N.H., Bonde, J.P., and Skotte, J. 1997. Semen analysis of personnel operating military radar equipment. Reprod. Toxicol. 11(6): 897. doi:10.1016/S0890-6238(97)00074-9. PMID: 9407601.
- Hocking, B., Gordon, I.R., Grain, H.L., and Hatfield, G.E. 1996. Cancer incidence and mortality and proximity to TV towers. Med. J. Aust. 165: 601–605. PMID:8985435.
- Huber, R., Treyer, V., Borbély, A.A., Schuderer, J., Gottselig, J.M., Landolt, H.-P., Werth, E., Berthold, T., Kuster, N., Buck, A., and Achermann, P. 2002. Electromagnetic fields, such as those from mobile phones, alter regional cerebral blood flow and sleep and waking EEG. J. Sleep Res. 11(4): 289–295. doi:10.1046/j. 1365-2869.2002.00314.x.
- Hung, C.S., Anderson, C., Horne, J.A., and McEvoy, P. 2007. Mobile phone 'talk-mode' signal delays EEG-determined sleep onset. Neurosci. Lett. 421(1): 82–86. doi:10.1016/j.neulet.2007.05.027.
- Hutter, H.-P., Moshammer, H., Wallner, P., and Kundi, M. 2006. Subjective symptoms, sleeping problems, and cognitive performance in subjects living near mobile phone base stations. Occup. Environ. Med. 63(5): 307–313. doi:10.1136/oem.2005.020784.
- ICNIRP. 1998. Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields. International Council on Non-Ionizing Radiation (ICNIRP). Oberschleisseim, Germany 1998. www.icnirp.org/documents/emfgdl.pdf. (Accessed October 2010.)
- Ivaschuk, O.I., Jones, R.A., Ishida-Jones, T., Haggren, W., Adey, W.R., and Phillips, J.L. 1997. Exposure of nerve growth factor-treated PC12 rat pheochromocytoma cells to a modulated radio-frequency field at 836.55 MHz: effects on c-jun and c-fos expression. Bioelectromagnetics, 18(3): 223–229. doi:10.1002/(SICI)1521-186X(1997)18:3<223::AID-BEM4>3.0.CO;2-4.
- Jech, R., Sonka, K., Ruzicka, E., Nebuzelsky, A., Bohm, J., Juklickova, M., and Nevsimalova, S. 2001. Electromagnetic field of mobile phones affects visual event related potential in patients with narcolepsy. Bioelectromagnetics, 22: 519–528. doi:10.1002/bem.81.
- Johnson, R.B., Spackman, D., Crowley, J., Thompson, D., Chou, C.K., Kunz, L.L., and Guy, A.W. 1983. Effects of long-term low-level radiofrequency radiation exposure on rats, Vol. 4, Open field behavior and corticosterone, USAF SAM-TR83-42, Report of U.S. Air Force (USAF) School of Aerospace Medicine, Brooks City Air Force Base, San Antonio, Tex.
- Johnson-Liakouris, A.J. 1998. Radiofrequency (RF) sickness in the Lilienfeild Study; an effect of modulated microwaves? Arch. Environ. Health, 53: 236–238. PMID:9814721.
- Joseph, W., Vermeeren, G., Verloock, L., and Martens, L. 2010. Estimation of whole-body SAR from electromagnetic fields using personal exposure meters. Bioelectromagnetics, 31: 286– 295.
- Kesari, K.K., and Behari, J. 2009. Fifty-gigahertz microwave exposure effect of radiations on rat brain. Appl. Biochem. Biotechnol. 158(1): 126–139. doi:10.1007/s12010-008-8469-8.
- Kesari, K.K., and Behari, J. 2010. Microwave exposure affecting reproductive system in male rats. Appl. Biochem. Biotechnol. 162(2): 416–428. doi:10.1007/s12010-009-8722-9.
- Kesari, K.K., Behari, J., and Kumar, S. 2010. Mutagenic response of 2.45 GHz radiation exposure on rat brain. Int. J. Radiat. Biol. 86(4): 334–343. doi:10.3109/09553000903564059.
- King, N.W., Justesen, D.R., and Clarke, R.L. 1971. Behavioral sen-

- sitivity to microwave irradiation. Science, **172**(3981): 398-401. doi:10.1126/science.172.3981.398.
- Kolodynski, A., and Kolodynski, V. 1996. Motor and psychological functions of school children living in the area of the Skundra Radio Location Station in Latvia. Sci. Total Environ. 180(1): 87–93. doi:10.1016/0048-9697(95)04924-X.
- Kristiansen, I.S., Elstein, A.S., Gyrd-Hansen, D., Kildemoes, H.W., and Nielsen, J.B. 2009. Radiation from mobile phone systems: Is it perceived as a threat to people's health? Bioelectromagnetics, 30(5): 393–401. doi:10.1002/bem.20484.
- Kumlin, T., Iivonen, H., Miettinen, P., Juvonen, A., van Groen, T., Puranen, L., Pitkäaho, R., Juutilainen, J., and Tanila, H. 2007. Mobile phone radiation and the developing brain: behavioral and morphological effects in juvenile rats. Radiat. Res. 168(4): 471–479. doi:10.1667/RR1002.1.
- Kwee, S., Raskmark, P., and Velizarov, P. 2001. Changes in cellular proteins due to environmental non-ionizing radiation. I. Heatshock proteins. Electro- Magnetobiol. 20: 141–152. doi:10.1667/RR1002.1.
- Lai, H., Horita, A., Chou, C.K., and Guy, A.W. 1987. Effects of low-level microwave irradiation on hippocampal and frontal cortical choline uptake are classically conditionable. Pharmacol. Biochem. Behav. 27(4): 635–639. doi:10.1016/0091-3057(87) 90186-9.
- Lai, H., Carino, M.A., Horita, A. and Guy, A.W. 1992. Single vs. repeated microwave exposure: effects on benzodiazepine receptors in the brain of the rat. Bioelectromagnetics 13:57-66. PMID:1312845.
- Lai, H., Carino, M.A., Horita, A. and Guy, A.W. 1989. Low-level microwave irradiation and central cholinergic systems. Pharmacol. Biochem. Behav. 33(1): 131–138. doi:10.1016/0091-3057(89)90442-5.
- Lebedeva, N.N., Sulimov, A.V., Sulimova, O.P., Kotrovskaya, T.I., and Gailus, T. 2000. Cellular phone electromagnetic field effects on bioelectric activity of human brain. Crit. Rev. Biomed. Eng. 28: 323–337. PMID: 10999398.
- Lerchl, A., Krüger, H., Niehaus, M., Streckert, J.R., Bitz, A.K., and Hansen, V. 2008. Effects of mobile phone electromagnetic fields at nonthermal SAR values on melatonin and body weight of Djungarian hamsters (*Phodopus sungorus*). J. Pineal Res. 44(3): 267–272. doi:10.1111/j.1600-079X.2007.00522.x.
- Levitt, B.B, Electromagnetic fields, A consumer's guide to the issues and how to protect ourselves, Harcourt Brace & Co., San Diego, New York, London, 1995, p. 23.
- Levitt, B.B., Cell-phone towers and communities, The struggle for local control. Orion Afield, Publisher, The Orion Society, Great Barrington, Mass. Autumn 1998, pp. 32–36.
- Lilienfield, A.M., Libauer, G.M., Cauthen, J., Tonascia, S., and Tonascia, J. 1978. Evaluation of health status of foreign service and other employees from selected eastern European embassies. Foreign Service Health Status Study, Final Report; Contract No. 6025-619037 (NTIS publication P8-288 163/9) Washington, D.C.; National Technical Information Service, U.S. Department of Commerce.
- Luukkonen, J., Hakulinen, P., Mäki-Paakkanen, J., Juutilainen, J., and Naarala, J. 2009. Enhancement of chemically induced reactive oxygen species production and DNA damage in human SH-SY5Y neuroblastoma cells by 872 MHz radiofrequency radiation. Mutat. Res. 662: 54–58. PMID:19135463.
- Magras, I.N., and Xenos, T.D. 1997. RF radiation-induced changes in the prenatal development of mice. Bioelectromagnetics, 18(6): 455–461. doi:10.1002/(SICI)1521-186X(1997) 18:6<455::AID-BEM8>3.0.CO;2-1.
- Mann, K., Wagner, P., Brunn, G., Hassan, F., Hiemke, C., and

- Roschke, J. 1998. Effects of pulsed high-frequency electromagnetic fields on the neuroendocrine system. Neuroendocrinology, **67**: 139–144. doi:10.1159/000054308.
- Mann, S.M., Cooper, T.G., Allen, S.G., Blackwell, R.P., and Lowe, A.J. 2002. Exposures to radio waves near mobile phone base stations. Chilton. National Radiological Protection Board, NRPB-R321. Available from: www.hpa.org.uk/radiation/ publications/archive/reports/2000/nrpb_r321. (Accessed October 2010.)
- Manville, A., III. 2007. Briefing paper on the need for research into the cumulative impacts of communication towers on migratory birds and other wildlife in the United States. Communication Tower Research Needs - Public Briefing-2-807.doc, Division of Migratory Bird Management (DMBM), U.S. Fish & Wildlife Service, updated 13 August 2007.
- Marinelli, F., La Sala, D., Cicciotti, G., Cattini, L., Trimarchi, C., Putti, S., Zamparelli, A., Giuliani, L., Tomassetti, G., and Cinti, C. 2004. Exposure to 900 MHz electromagnetic field induces an unbalance between pro-apoptotic and pro-survival signals in T-lymphoblastoid leukemia CCRF-CEM cells. J. Cell. Physiol. 198(2): 324–332. doi:10.1002/jcp.10425.
- Markkanen, A., Penttinen, P., Naarala, J., Pelkonen, J., Sihvonen, A.P., and Juutilainen, J. 2004. Apoptosis induced by ultraviolet radiation is enhanced by amplitude modulated radiofrequency radiation in mutant yeast cells. Bioelectromagnetics, 25(2): 127–133. doi:10.1002/bem.10167.
- Markovà, E., Hillert, L., Malmgren, L., Persson, B.R., and Belyaev, I.Y. 2005. Microwaves from GSM mobile telephones affect 53BP1 and gamma-H2AX foci in human lymphocytes from hypersensitive and healthy persons. Environ. Health Perspect. 113(9): 1172–1177. doi:10.1289/ehp.7561.
- Martínez-Búrdalo, M., Martín, A., Anguiano, M., and Villar, R. 2005. On the safety assessment of human exposure in the proximity of cellular communications base-station antennas at 900, 1800 and 2170 MHz. Phys. Med. Biol. 50(17): 4125–4137. doi:10.1088/0031-9155/50/17/015.
- Maskarinec, G., Cooper, J., and Swygert, I. 1994. Investigation of increased incidence in childhood leukemia near radio towers in Hawaii: preliminary observations. J. Environ. Pathol. Toxicol. Oncol. 13: 33–37. PMID:7823291.
- Michelozzi, P., Capon, A., Kirchmayer, U., Forastiere, F., Biggeri, A., Barca, A., and Perucci, C.A. 2002. Adult and childhood leukemia near a high-power radio station in Rome, Italy. Am. J. Epidemiol. 155(12): 1096–1103. doi:10.1093/aje/155.12.1096.
- Mitchell, D.S., Switzer, W.G., and Bronaugh, E.L. 1977. Hyperactivity and disruption of operant behavior in rats after multiple exposure to microwave radiation. Radio Sci. 12(6S): 263–271. doi:10.1029/RS012i06Sp00263.
- NCRP. 1986. Biological effects and exposure criteria for radiofrequency electromagnetic fields. National Council on Radiation Protection and Measurements. NCRP Report No. 86, 2 April 1986.
- Navakatikian, M.A., and Tomashevskaya, L.A. 1994. Phasic behavioral and endocrine effects of microwaves of nonthermal intensity. In Biological Effects of Electric and Magnetic Fields, Vol. 1. Edited by D.O. Carpenter. Academic Press, San Diego, Calif.
- Navarro, A.E., Sequra, J., Portolés, M., and Gómez-Perretta de Mateo, C. 2003. The microwave syndrome: a preliminary study in Spain. Electromagn. Biol. Med. 22(2-3): 161–169. doi:10.1081/JBC-120024625.
- Neubauer, G., Feychting, M., Hamnerius, Y., Kheiferts, L., Kuster, N., Ruiz, I., Schüz, J., Überbacher, R., Wiart, J., and Röösli, M. 2007. Feasibility of future epidemiology studies on possible

- health effects of mobile phone base stations. Bioelectromagnetics, **28**(3): 224–230. doi:10.1002/bem.20298.
- Neubauer, G., Cecil, S., Giczi, W., Petric, B., Preiner, P., and Frolich, J. 2008. Final report on the project C2006-07, evaluation of the correlation between RF dosimeter reading and real human exposure, Austrian Research Centres ARC-Report ARC-IT-0218, April 2008.
- Nittby, H., Grafström, G., Tian, D.P., Malmgren, L., Brun, A., Persson, B.R., Salford, L.G., and Eberhardt, J. 2008. Cognitive impairment in rats after long-term exposure to GSM-900 mobile phone radiation. Bioelectromagnetics, 29(3): 219–232. doi:10. 1002/bem.20386.
- Novoselova, E.G., Fesenko, E.E., Makar, V.R., and Sadovnikov, V.B. 1999. Microwaves and cellular immunity II. Immunostimulating effects of microwaves and naturally occurring antioxidant nutrients. Bioelectrochem. Bioenerg. 49(1): 37–41. doi:10.1016/ S0302-4598(99)00059-8.
- Novoselova, E.G., Ogay, V.B., Sorokina, O.V., Glushkova, O.V., Sinotova, O.A., and Fesenko, E.E. 2004. The production of tumor necrosis factor in cells of tumor-bearing mice after totalbody microwave irradiation and antioxidant diet. Electromagn. Biol. Med. 23: 167–180.
- Oberfeld, G., Navarro, A.E., Portoles, M., Maestu, C., and Gomez-Perretta, C. 2004. The microwave syndrome – further aspects of a Spanish study. *In Proceedings of the 3rd International Work*shop on Biological Effects of Electromagnetic Fields, Kos, Greece, 4–8 October 2004.
- Ofcom. 2008 The Communications Market Interim Report, August 2008. Ofcom, London, UK. Available from http://www.ofcom.org.uk/research/cm/cmr08/. (Accessed October 2010.)
- Oscar, K.J., and Hawkins, T.D. 1977. Microwave alteration of the blood-brain barrier system of rats. Brain Res. 126(2): 281–293. doi:10.1016/0006-8993(77)90726-0.
- Panagopoulos, D.J., and Margaritis, L.H. 2010a. The identification of an intensity 'window' on the bioeffects of mobile telephony radiation. Int. J. Radiat. Biol. 86(5): 358–366. doi:10.3109/ 09553000903567979.
- Panagopoulos, D.J., and Margaritis, L.H. 2010b. The effect of exposure duration on the biological activity of mobile telephony radiation. Mutat. Res. 699: 17–22.
- Panagopoulos, D.J., Chavdoula, E.D., and Margaritis, L.H. 2010. Bioeffects of mobile telephony radiation in relation to its intensity or distance from the antenna. Int. J. Radiat. Biol. 86(5): 345–357. doi:10.3109/09553000903567961.
- Park, S.K., Ha, M., and Im, H.-J. 2004. Ecological study on residences in the vicinity of AM radio broadcasting towers and cancer death: preliminary observations in Korea. Int. Arch. Occup. Environ. Health, 77(6): 387–394. doi:10.1007/s00420-004-0512-7
- Pavicic, I., and Trosic, I. 2008. Impact of 864 MHz or 935 MHz radiofrequency microwave radiation on the basic growth parameters of V79 cell line. Acta Biol. Hung. 59(1): 67–76. doi:10. 1556/ABiol.59.2008.1.6.
- Pérez-Castejón, C., Pérez-Bruzón, R.N., Llorente, M., Pes, N., Lacasa, C., Figols, T., Lahoz, M., Maestú, C., Vera-Gil, A., Del Moral, A., and Azanza, M.J. 2009. Exposure to ELF-pulse modulated X band microwaves increases in vitro human astrocytoma cell proliferation. Histol. Histopathol. 24: 1551–1561.
- Persson, B.R.R., Salford, L.G., and Brun, A. 1997. Blood-brain barrier permeability in rats exposed to electromagnetic fields used in wireless communication. Wirel. Netw. 3(6): 455–461. doi:10.1023/A:1019150510840.
- Phillips, J.L., Ivaschuk, O., Ishida-Jones, T., Jones, R.A., Campbell-Beachler, M., and Haggren, W. 1998. DNA damage in

- Molt-4 T-lymphoblastoid cells exposed to cellular telephone radiofrequency fields in vitro. Bioelectrochem. Bioenerg. **45**(1): 103–110. doi:10.1016/S0302-4598(98)00074-9.
- Pologea-Moraru, R., Kovacs, E., Iliescu, K.R., Calota, V., and Sajin, G. 2002. The effects of low level microwaves on the fluidity of photoreceptor cell membrane. Bioelectrochemistry, 56(1-2): 223-225. doi:10.1016/S1567-5394(02)00037-3.
- Pyrpasopoulou, A., Kotoula, V., Cheva, A., Hytiroglou, P., Nikola-kaki, E., Magras, I.N., Xenos, T.D., Tsiboukis, T.D., and Karka-velas, G. 2004. Bone morphogenetic protein expression in newborn rat kidneys after prenatal exposure to radiofrequency radiation. Bioelectromagnetics, 25(3): 216–227. doi:10.1002/bem.10185.
- Radon, K., Spegel, H., Meyer, N., Klein, J., Brix, J., Wiedenhofer, A., Eder, H., Praml, G., Schulze, A., Ehrenstein, V., von Kries, R., and Nowak, D. 2006. Personal dosimetry of exposure to mobile telephone base stations? An epidemiological feasibility study comparing the Maschek dosimeter prototype and Antennessa SP-090 system. Bioelectromagnetics, 27(1): 77–81. doi:10.1002/bem.20175.
- REFLEX 2004. REFLEX Final Report: Risk evaluation of potential environmental hazards from low frequency electromangetic field exposure using sensitivie in vitro methods, Europena Union, Quality of Life and Management of Living Resources, Contract: QLK4-CT-1999-01574, 1 February 2000 31 May 2004 Available at http://www.itis.ethz.ch/downloads/REFLEX_Final%20Report_171104.pdf. (Accessed October 2010.)
- Regel, S.J., Negovetic, S., Röösli, M., Berdiñas, V., Schuderer, J., Huss, A., Lott, U., Kuster, N., and Achermann, P. 2006. UMTS base station-like exposure, well-being, and cognitive performance. Environ. Health Perspect. 114(8): 1270–1275. doi:10. 1289/ehp.8934.
- Rinebold, J.M. 2001. State centralized siting of telecommunications facilities and cooperative efforts with Connecticut towns. *In* Cell Towers, Wireless Convenience? or Environmental Hazard? *In* Proceedings of the Cell Towers Forum, State of the Science/ State of the Law. *Edited by B.B.* Levitt. Safe Goods/New Century, Sheffield, Mass. pp. 129–141.
- Roux, D., Vian, A., Girard, S., Bonnet, P., Paladian, F., Davies, E., and Ledoigt, G. 2008a. High frequency (900 MHz) low amplitude (5 V m-1) electromagnetic field: a genuine environmental stimulus that affects transcription, translation, calcium and energy charge in tomato. Planta, 227(4): 883–891. doi:10.1007/s00425-007-0664-2.
- Roux, D., Faure, C., Bonnet, P., Girard, S., Ledoigt, G., Davies, E., Gendraud, M., Paladian, F., and Vian, A. 2008b. A possible role for extra-cellular ATP in plant responses to high frequency, lowamplitude electromagnetic field. Plant Signal. Behav. 3: 383– 385
- Sage, C., and Carpenter, D.O. 2009. Public health implications of wireless technologies. Pathophysiology, 16(2-3): 233–246. doi:10.1016/j.pathophys.2009.01.011.
- Salford, L.G., Brun, A.R., Eberhardt, J.L., Malmgren, L., and Persson, B.R.R. 2003. Nerve cell damage in mammalian brain after exposure to microwaves from GSM mobile phones. Environ. Health Perspect. 111(7): 881–883. doi:10.1289/ehp.6039.
- Sanders, A.P., Joines, W.T., and Allis, J.W. 1985. Effect of continuous-wave, pulsed, and sinusoidal-amplitude-modulated microwaves on brain energy metabolism. Bioelectromagnetics, 6(1): 89-97. doi:10.1002/bem.2250060109.
- Santini, R., Santini, P., Danze, J.M., Le Ruz, P., and Seigne, M. 2002. Enquête sur la santé de riverains de stations relais de téléphonie mobile: Incidences de la distance et du sexe. Pathol. Biol. 50: 369-373. doi:10.1016/S0369-8114(02)00311-5.

- Sarimov, R., Malmgren, L.O.G., Markova, E., Persson, B.R.R., and Belyaev, I.Y. 2004. Nonthermal GSM microwaves affect chromatin conformation in human lymphocytes similar to heat shock. IEEE Trans. Plasma Sci. 32(4): 1600–1608. doi:10.1109/ TPS 2004 832613.
- Schrot, J., Thomas, J.R., and Banvard, R.A. 1980. Modification of the repeated acquisition of response sequences in rats by low-level microwave exposure. Bioelectromagnetics, 1(1): 89–99. doi:10.1002/bem.2250010109.
- Schwartz, J.L., House, D.E., and Mealing, G.A. 1990. Exposure of frog hearts to CW or amplitude-modulated VHF fields: selective efflux of calcium ions at 16 Hz. Bioelectromagnetics, 11(4): 349–358. doi:10.1002/bem.2250110409.
- Schwarz, C., Kratochvil, E., Pilger, A., Kuster, N., Adlkofer, F., and Rüdiger, H.W. 2008. Radiofrequency electromagnetic fields (UMTS, 1,950 MHz) induce genotoxic effects in vitro in human fibroblasts but not in lymphocytes. Int. Arch. Occup. Environ. Health, 81(6): 755–767. doi:10.1007/s00420-008-0305-5.
- SCENIHR. 2009. Health effects of exposure to EMF, European Commission, Health & Consumer Protection DG. Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR), 19 January 2009.
- Seaman, R.L., and Wachtel, H. 1978. Slow and rapid responses to CW and pulsed microwave radiation by individual Aplysia pacemakers. J. Microw. Power, 13: 77–86.
- Siegrist, M., Earle, T.C., Gutscher, H., and Keller, C. 2005. Perception of mobile phone and base station risks. Risk Anal. 25(5): 1253–1264. doi:10.1111/j.1539-6924.2005.00672.x.
- Silke, T., Heinrich, S., Kuhnlein, A., and Radon, K. 2010. The association between socioeconomic status and exposure to mobile telecommunication networks in children and adolescents. Bioelectromagnetics, 31: 20–27.
- Sirav, B., and Seyhan, N. 2009. Radio frequency radiation (RFR) from TV and radio transmitters at a pilot region in Turkey. Radiat. Prot. Dosimetry, 136(2): 114–117. doi:10.1093/rpd/ncp152.
- Somosy, Z., Thuroczy, G., Kubasova, T., Kovacs, J., and Szabo, L.D. 1991. Effects of modulated and continuous microwave irradiation on the morphology and cell surface negative charge of 3T3 fibroblasts. Scanning Microsc. 5: 1145–1155.
- Stagg, R.B., Thomas, W.J., Jones, R.A., and Adey, W.R. 1997. DNA synthesis and cell proliferation in C6 glioma and primary glial cells exposed to a 836.55 MHz modulated radiofrequency field. Bioelectromagnetics, 18(3): 230–236. doi:10.1002/(SICI) 1521-186X(1997)18:3<230::AID-BEM5>3.0.CO;2-3.
- Stankiewicz, W., Dabrowski, M.P., Kubacki, R., Sobiczewska, E., and Szmigielski, S. 2006. Immunotropic influence of 900 MHz microwave GSM signal on human blood immune cells activated in vitro. Electromagn. Biol. Med. 25(1): 45–51. doi:10.1080/15368370600572961.
- State of Hawaii, 1991. Investigation of Childhood Leukemia on Waianae Coast 1977–1990. Environmental Epidemiology Program. State of Hawaii Department of Health.
- Takashima, S., Onaral, B., and Schwan, H.P. 1979. Effects of modulated RF energy on the EEG of mammalian brain. Radiat. Environ. Biophys. 16(1): 15–27. doi:10.1007/BF01326893.
- Tattersall, J.E., Scott, I.R., Wood, S.J., Nettell, J.J., Bevir, M.K., Wang, Z., Somasiri, N.P., and Chen, X. 2001. Effects of low intensity radiofrequency electromagnetic fields on electrical activity in rat hippocampal slices. Brain Res. 904(1): 43–53. doi:10. 1016/S0006-8993(01)02434-9.
- Tell, R. 2008. An analysis of radiofrequency fields associated with operation of the Hydro One Smart Meter System, October 28, 2008. Report by Richard A. Tell, Associates, Inc., Colville, Wash., for Hydro One Networks, Inc., Toronto, Ont.

- Thomas, J.R., Finch, E.D., Fulk, D.W., and Burch, L.S. 1975. Effects of low level microwave radiation on behavioral baselines. Ann. N. Y. Acad. Sci. 247(1 Biologic Effe): 425-432. doi:10.1111/j.1749-6632.1975.tb36018.x.
- Tolgskaya, M.S., and Gordon, A.V. 1973. Pathological effects of radio waves. Soviet Science Consultants Bureau, New York. pp. 133-137.
- United States Senate. 1979. Microwave rrradiation of the U.S. Embassy in Moscow, Committee on Commerce, Science and Transportation. 96th Congress, 1st session, April 1979, pp. 1–23.
- U.S. FCC. 1997. Evaluating compliance with FCC-specified guidelines for human exposure to radiofrequency radiation, U.S. Federal Communications Commission. Office of Engineering and Technology, OET Bulletin 65, Edition 97-101, August 1997, Washington, DC. Available from http://www.fcc.gov/Bureaus/ Engineering_Technology/Documents/bulletins/oet65/oet65.pdf. (Accessed October 2010).
- van Wyk, M.J., Bingle, M., and Meyer, F.J. 2005. Antenna modeling considerations for accurate SAR calculations in human phantoms in close proximity to GSM cellular base station antennas. Bioelectromagnetics, 26(6): 502–509. doi:10.1002/bem.20122.
- Velizarov, S., Raskmark, P., and Kwee, S. 1999. The effects of radiofrequency fields on cell proliferation are non-thermal. Bioelectrochem. Bioenerg. 48(1): 177–180. doi:10.1016/S0302-4598(98)00238-4.
- Veyret, B., Bouthet, C., Deschaux, P., de Seze, R., Geffard, M., Joussot-Dubien, J., Diraison, M., Moreau, J.M., and Caristan, A. 1991. Antibody responses of mice exposed to low-power microwaves under combined, pulse-and-amplitude modulation. Bioelectromagnetics, 12(1): 47–56. doi:10.1002/bem.2250120107.
- Vian, A., Roux, D., Girard, S., Bonnet, P., Paladian, F., Davies, E., and Ledoigt, G. 2006. Microwave irradiation affects gene expression in plants. Plant Signal. Behav. 1(2): 67–70.
- Viel, J.-F., Clerc, S., Barberra, C., Rymzhanova, R., Moissonnier, M., Hours, M., and Cardis, E. 2009. Residential exposure to radiofrequency fields from mobile-phone base stations, and broadcast transmitters: a population-based survey with personal

- meter. Occup. Environ. Med. **66**(8): 550–556. doi:10.1136/oem. 2008.044180.
- Wachtel, H., Seaman, R., and Joines, W. 1975. Effects of low-intensity microwaves on isolated neurons. Ann. N.Y. Acad. Sci. 247(1 Biologic Effe): 46–62. doi:10.1111/j.1749-6632.1975. tb35982.x.
- Wallace, D., Eltiti, S., Ridgewell, A., Garner, K., Russo, R., Sepulveda, F., Walker, S., Quinlan, T., Dudley, S., Maung, S., Deeble, R., and Fox, E. 2010. Do TETRA (Airwave) base station signals have a short-term impact on health and well-being? A randomized double-blind provocation study. Environ. Health Perspect. 118(6): 735–741. doi:10.1289/ehp.0901416.
- Wang, B.M., and Lai, H. 2000. Acute exposure to pulsed 2450-MHz microwaves affects water-maze performance of rats. Bioelectromagnetics, 21(1): 52–56. doi:10.1002/(SICI)1521-186X(200001)21:1<52::AID-BEM8>3.0.CO;2-6.
- Wiart, J., Hadjem, A., Wong, M.F., and Bloch, I. 2008. Analysis of RF exposures in the head tissues of children and adults. Phys. Med. Biol. 53(13): 3681–3695. doi:10.1088/0031-9155/53/13/ 019
- Wilén, J., Johansson, A., Kalezic, N., Lyskov, E., and Sandström, M. 2006. Psychophysiological tests and provocation of subjects with mobile phone related symptoms. Bioelectromagnetics, 27(3): 204–214. doi:10.1002/bem.20195.
- Wolf, R., and Wolf, D. 2004. Increased incidence of cancer near a cell-phone transmitter station. Inter. J. Cancer Prev. 1(2): 123– 128.
- Wolke, S., Neibig, U., Elsner, R., Gollnick, F., and Meyer, R. 1996. Calcium homeostasis of isolated heart muscle cells exposed to pulsed high-frequency electromagnetic fields. Bioelectromagnetics, 17(2): 144–153. doi:10.1002/(SICI)1521-186X(1996)17:2<144::AID-BEM9>3.0.CO;2-3.
- Yurekli, A.I., Ozkan, M., Kalkan, T., Saybasili, H., Tuncel, H., Atukeren, P., Gumustas, K., and Seker, S. 2006. GSM base station electromagnetic radiation and oxidative stress in rats. Electromagn. Biol. Med. 25(3): 177-188. doi:10.1080/ 15368370600875042.

Hackett, Maurice

From:

Thomas Garten <tomgarten@yahoo.com>

Sent:

Monday, September 15, 2014 4:09 PM

To:

Matt Yergovich; myergo@gmail.com; Hackett, Maurice; Pattillo, Chris; Moore, Jim;

jahazielbonillaoaklandpc@gmail.com; Coleman, Michael;

jmyres.oaklandplanningcommission@gmail.com; nagrajplanning@gmail.com;

ew.oakland@gmail.com; dist5@acgov.org; Schaaf, Libby; Ruhland, Lisa; Stoffmacher,

Bruce; Melyssa Minamoto; Cowan, Richard

Subject:

Residents' Opposition Brief for PLN-14036, Set for Hearing on Sept. 17

Attachments:

PLN14036 - Opposition Brief to Planning Commission.pdf; Part 1 of 2 - Exhibits 1-10 to

Opposition Brief.pdf

All:

A Public Hearing on Case File No. PLN-14036 is set to take place on Wednesday, September 17th. On behalf of concerned residents, attached please find an opposition brief to AT&T's proposal to construct a macro telecommunications facility on two existing utility poles on Mountain Boulevard. We hope that the Planning Commission and public officials consider the arguments set forth in the attached before making a decision about whether to approve AT&T's proposal.

Best regards,

Tom Garten & Melyssa Minamoto 1300 Mountain Boulevard Oakland, CA 94611

ATTACHMENTS:

- (1) Opposition Brief to Planning Commission
- (2) Exhibits 1-10 (one PDF)
- (3) Exhibits 11-21 (one PDF, sent by separate email)

CC:

Oakland Planning Commission
Matt Yergovich (Applicant's Representative)
Maurice Hackett (Planner)
Libby Schaaf (District 4 Councilmember)
Keith Carson (District 5 County Supervisor)
Richard Cowan (Special Assistant to Mayor Jean Quan)