NOTE: APPENDICES ARE IN THE CODE

July 8, 199_ Introduced by: Barden/Laing

Proposed No.: 90-511

ORDINANCE NO. 10021

AN ORDINANCE relating to zoning; defining terms; regulating communications facilities by type and zone; prescribing standards; amending Resolution 25789, Sections 1301, 1401, 1601, 1901, 2101, and 2202; Ordinance 1730, Section 1; Ordinance 3144, Sections 3, 6, and 7; Ordinance 3594, Section 3; Ordinance 4303, Section 3; Ordinance 5318, Section 4; Ordinance 7636, Sections 2, 3 and 4; and Ordinance 7675, Section 3; all as amended; amends K.C.C. 21.08.030; 21.08.060; 21.08.070; 21.22.030; 21.23.020; 21.23.030; 21.23.040; 21.25.020; 21.26.020; 21.27.040; 21.28.020; 21.32.020; 21.37.030; 21.38.020; 21.42.020; 21.44.020; and 21.44.030; adding new sections to K.C.C. 21; and repealing Ordinance 6765, Sections 1-4 as amended; Ordinance 7212, as amended; K.C.C. 20.12.327; and K.C.C. 21.12.328.

BE IT ORDAINED BY THE COUNCIL OF KING COUNTY:

NEW SECTION. SECTION 1. There is added to K.C.C. 21 a new section to read as follows:

Purpose. The purpose of this chapter is to protect the general public from the effects of non-ionizing electromagnetic radiation (NIER); to assure greater compatibility between communication facilities and adjacent land uses; and to provide for the communication needs of the region by:

A. Creating a health standard limiting exposure to NIER from existing and new communication facilities;

B. Establishing design and operating standards for new communication facilities; and

C. Providing for the modification or consolidation of existing communication facilities.

NEW SECTION. SECTION 2. There is added to K.C.C. 21 a new section to read as follows:

Exemptions. The following are exempt from the provisions of this Chapter and shall be permitted in all zones:

A. Industrial processing equipment and scientific or medical equipment using frequencies regulated by the Federal Communications Commission (FCC);

B. Machines and equipment that are designed and marketed as

consumer products, such as microwave ovens and remote control toys;

C. The storage, shipment or display for sale of transmission equipment;

D. Radar systems for military and civilian communication and navigation;

E. Hand-held, mobile, marine and portable radio transmitters and/or receivers;

F. Two-way radio utilized for temporary or emergency services communications;

G. Licensed amateur (Ham) radio stations and citizen band stations;

H. Earth station downlinks using satellite dish antenna(e) with a diameter of less than 12 feet and less than ten watts, provided that stations in excess of one dish antenna(e) are subject to conditional use permits;

I. Receive-only satellite dish antenna(e) as an accessory use; or

J. Two-way radio antennae, point-to-point microwave dishes, and cellular radio antennae which are not located on a transmission structure (lattice towers and monopoles).

K. Any maintenance, reconstruction, repair or replacement of a conforming or nonconforming communication facility, transmission equipment, transmission structure or transmitter building; provided, that the transmission equipment does not result in noncompliance with sections 10 and 13 of this ordinance. In the event a building permit is required for any emergency maintenance, reconstruction, repair or replacement, filing of the building permit application shall not be required until 30 days after the completion of such emergency activities. In the event a building permit is required for nonemergency maintenance, reconstruction, repair or replacement, filing of the

building permit application shall be required prior to the commencement of such nonemergency activities.

NEW SECTION. SECTION 3. There is added to K.C.C. 21 a new section to read as follows:

Applicability. All communication facilities which are not exempt under section 2 of this ordinance shall comply with the provisions of this chapter as follows:

A. New communication facilities, with the exception of consolidations, shall comply with the provisions of sections 2 through 13 and 16 through 19 of this ordinance;

B. Modified communication facilities, with the exception of consolidations, shall comply with standards as provided in sections 2 through 4, 6 through 14 and 16 through 19 of this ordinance; and

C. Consolidations shall comply with standards as provided in sections 2 through 4, 6 through 13, and 15 through 19 of this ordinance.

NEW SECTION. SECTION 4. There is added to K.C.C. 21 a new section to read as follows:

Review process by zone. Communication facilities shall be permitted and reviewed as shown on Appendix A of this ordinance. Minor communication facilities for the transmission or reception of cellular radio signals shall be permitted and reviewed as shown on Appendix A-1 of this ordinance.

NEW SECTION. SECTION 5. There is added to K.C.C. 21 a new section to read as follows:

Setback requirements. The following are minimum setbacks and shall be increased to ensure compliance with the standards of sections 10 and 13 of this ordinance:

A. Transmission structures, which do not exceed the height limit of the zone in which they are located, shall be set back from the property line as required by such zone in which the

transmission structure is located.

B. Transmission structures, which exceed the height limit of the zone in which they are located, shall be set back from property lines either a minimum of 50 feet or one foot for every foot in height, whichever results in the greater setback, except:

1. Transmission structures located in the A, F, B, C or M zones shall be set back from the property line as required by the zone in which they are located; and

2. Transmission structures for the transmission or reception of cellular radio signals shall be set back from the property line as provided in Appendix A-1.

C. When two or more communication facilities share a common boundary, the setback from such boundary shall comply with the requirements of the zone in which the facilities are located, unless easements are provided:

1. On the adjoining sites which limit development to communication facilities; and

2. Of sufficient depth to provide the setbacks required in Subsections A and B; and

3. Which provide for King County as a third party signatory to the agreement.

D. Transmitter buildings shall be subject to the setback requirements of the zone in which they are located.

NEW SECTION. SECTION 6. There is added to K.C.C. 21 a new section to read as follows:

Landscaping requirements. A communication facility site shall provide landscaping as follows:

A. An appropriate area surrounding the installation shall be landscaped and maintained with paving, shrubs, and ground cover consistent with the surrounding residential standards.

B. When the facility includes bulky structures such as transmitter buildings or transmission structures, the landscaping

shall include trees, either natural or planted, of such size as will partially screen and effectively break up the massive appearance of the structures and buildings.

C. When a security fence is used, it shall be supplemented with base plantings of evergreen shrubs, trees or climbing evergreen material on the fences or wood slats woven into the fence so as to minimize the industrial character of the fence.

D. Landscaping shall be planted according to accepted practice in good soil and maintained in good condition at all times. Landscaping shall be planted as a yard improvement at or before the time of completion of the first structure or within a reasonable time thereafter, considering weather and planting conditions.

E. A natural vegetative buffer can be retained which meets or exceeds the above requirements.

NEW SECTION. SECTION 7. There is added to K.C.C. 21 a new section to read as follows:

Color and lighting standards. Except as specifically required by the Federal Aviation Administration (FAA) or the FCC, transmission structures shall:

A. Use colors such as grey, blue or green which reduce their visual impacts; provided, wooden poles do not have to be painted; and

B. Not be illuminated, except transmitter buildings may use lighting for security reasons which is compatible with the surrounding neighborhood.

NEW SECTION. SECTION 8. There is added to K.C.C. 21 a new section to read as follows:

Fencing and NIER warning signs. Communication facility sites shall be:

A. Fenced in a manner which prevents access by the public to transmission structures and/or areas of the site where NIER or

shock/burn levels are exceeded. This may be modified if natural features, such as an adjoining waterway, or a topographic feature preclude access.

B. Signed to warn the public of areas of the site where:

1. NIER standards are exceeded; and

2. High risks for shocks or burns are present.

NEW SECTION. SECTION 9. There is added to K.C.C. 21 a new section to read as follows:

Interference. Applications for building, conditional use and/or unclassified use permits shall include:

A. A statement describing the nature and extent of interference which may be caused by the proposed communication facility and the applicant's responsibilities under FCC rules and regulations;

B. Unless the division determines that there will be no noticable interference from the proposed communication facility, notification of expected interference shall be provided as specified in section 17 of this ordinance; and

C. General information concerning the causes of interference and steps which can be taken to reduce or eliminate it.

NEW SECTION. SECTION 10. There is added to K.C.C. 21 a new section to read as follows:

NIER exposure standards. A communication facility, by itself or in combination with others, shall not expose the public to NIER that exceeds the electric or magnetic field strength, or the power density, for the frequency ranges and durations described in Appendix B of this ordinance; or cause whole-body energy absorption of .08 W/Kg or more.

NEW SECTION. SECTION 11. There is added to K.C.C. 21 a new section to read as follows:

NIER measurements and calculations. NIER levels shall be

measured and calculated as follows:

A. When measuring NIER for compliance with section 10 of this ordinance:

1. Measuring equipment used shall be generally recognized by the Environmental Protection Agency (EPA), National Council on Radiation Protection and Measurement (NCRPM), American National Standards Institute (ANSI), or National Bureau of Standards (NBS) as suitable for measuring NIER at frequencies and power levels of the proposed and existing sources of NIER.

2. Measurement equipment shall be calibrated as recommended by the manufacturer in accordance with methods used by the NBS and ANSI, whichever has the most current standard.

3. The effect of contributing individual sources of NIER within the frequency range of a broadband measuring instrument may be specified by separate measurement of these sources using a narrowband measuring instrument.

4. NIER measurements shall be taken when and where NIER levels are expected to be highest due to operating or environmental conditions.

5. NIER measurements shall be taken along the perimeter of the communication facility site and other areas on-site or off-site where the health department deems necessary to take measurements.

6. NIER measurements shall be taken following spatial averaging procedures generally recognized and used by experts in the field of RF measurement or other procedures recognized by the FCC, EPA, NCRPM, ANSI, NBS.

B. NIER calculations shall be consistent with the FCC, Office of Science and Technology (OST) bulletin 65 or other engineering practices recognized by the EPA, NCRPM, ANSI, NBS or similarly qualified organization.

C. Measurements and calculations shall be certified by a

licensed professional engineer and shall be accompanied by an explanation of the protocol, methods, equipment, and assumptions used.

NEW SECTION. SECTION 12. There is added to K.C.C. 21 a new section to read as follows:

Measurements and monitoring.

A. The department of public health shall measure or contract for measurement of NIER levels as necessary to insure that the NIER standard is not being exceeded.

B. The NIER level of existing major communication facilities shall be measured within 120 days from the effective date of this ordinance and every third year thereafter. The measurements shall be submitted to the department of public health for review within 60 days of measurement. The department shall be reimbursed for its review of the measurements pursuant to this section.

C. New major communication facilities shall be measured within 120 days from the commencement of the operation and every third year thereafter. The department shall be reimbursed for its review of the measurements pursuant to this section.

D. The department of public health shall have the authority to assess fees for the cost of plan review. The fee shall be based upon the time required by staff, including overhead cost, for plan review.

NEW SECTION. SECTION 13. There is added to K.C.C. 21 a new section to read as follows:

Shock and burn standard. The communication facility shall not emit radiation such that the public will be exposed to shock and burn in excess of the standards contained in ANSI C-95.1.

NEW SECTION. SECTION 14. There is added to K.C.C. 21 a new section to read as follows:

Modifications.

A. Cumulative modifications of conforming or nonconforming communication facilities, transmission structures or transmission equipment which do not increase the overall height of the transmission structure or transmission equipment by more than 30 percent shall be allowed provided:

1. A nonconformance with respect to the transmission structure shall not be created or increased, except as otherwise provided in subsection 14A as to height;

2. Existing perimeter vegetation or landscaping shall not be reduced; and

3. The modification results in compliance with sections 10 and 13 of this ordinance. The applicant shall provide King County a detailed certification of compliance with these provisions which has been prepared by a licensed professional engineer.

B. Except for consolidations allowed by section 15 of this ordinance, modifications which increase the overall height of the transmission structure or transmission equipment by more than 30 percent shall be subject to the following provisions:

1. Applications for such transmission structures shall be reviewed pursuant to the applicable process specified in section 4 of this ordinance.

2. Such transmission structures shall comply with the provisions of sections 2 through 4, 6 through 14 and 16 through 19 of this ordinance.

NEW SECTION. SECTION 15. There is added to K.C.C. 21 a new section to read as follows:

Consolidation. Consolidation of two or more existing transmission structures may be permitted subject to the

following:

A. If the consolidated transmission structure cannot meet the requirements of section 5 of this ordinance, it shall be located on the portion of the parcel on which it is situated which, giving consideration to the: (i) topography and dimensions of the site, (ii)(in the case of a consolidation) to any existing structures to be retained, and (iii) (in the case of a guyed transmission tower) to guy anchor placement necessary to assure structural integrity of the consolidated transmission tower, provides the optimum practical setback from adjacent properties. Consolidated transmission structures shall be set back from abutting residential property a minimum of ten percent of the height of the consolidated transmission structure, but in all cases no less than 100 feet.

B. If a consolidation involves the removal of transmission structures from two or more different sites and if a consolidated transmission structure is to be erected on one of those sites, it shall be erected on the site which provides for the greatest compliance with the standards of this ordinance;

C. All existing transmission equipment on the site of a communication facility which does not comply with the provisions of this chapter shall be relocated to the consolidated transmission structure before the relocation of transmission equipment from a non-exempt off-site, conforming communication facility is permitted;

D. The consolidation shall eliminate NIER and electrical current levels attributable to the consolidating transmission equipment which exceed the limits of sections 10 and 13 of this ordinance; and

E. Any transmission structure to be removed as part of a consolidation shall be removed within 12 months of relocation of the transmitting equipment.

F. Consolidation shall result in a net reduction in the number of transmission structures.

G. Consolidated facilities shall require a conditional use permit.

NEW SECTION. SECTION 16. There is added to K.C.C. 21 a new section to read as follows:

Supplemental application requirements.

A. In addition to any required site plan, a permit application for any communication facility shall also include:

1. A site plan which shows existing and proposed transmission structures; guy wire anchors; warning signs; fencing and access restrictions;

2. A report by a licensed professional engineer demonstrating compliance with applicable structural standards of the UBC, and describing the general structural capacity of any proposed transmission structure(s), including:

a. The number and type of antennae that can be accommodated; and

b. The basis for the calculation of capacity.

3. A report by a state licensed professional engineer that includes the following:

a. A description of any proposed transmission tower(s) or structure(s), including height above grade, materials, color and lighting; and

b.Information related to interference required by section 9 of this ordinance.

B. Where a permit for a non-exempt communication facility is required, the application shall also include the following information:

1. The name and address of the operator(s) of proposed and existing antennae on the site;

2. The height of any proposed antennae;

3. Manufacture, type, and model of such antennae;

4. Frequency, modulation and class or service;

5. Transmission and maximum effective radiated power;

6. Direction of maximum lobes and associated radiation;

7. The calculated NIER levels attributable to the proposed antennae at points along the property line and other areas off-site which are higher than the property line points, as well as calculated power density (NIER levels) in areas that are expected to be unfenced on-site; and

8. For a major communication facility, if there is another major communication facility within one mile of the site of the proposed facility, the level of NIER at the points identified in Subsection B(7) as measured within 30 days prior to application.

9. For a minor communication facility, if there is an existing major communication facility within one-half mile of the site of the proposed facility, the level of NIER at the points identified in subsection B(7) as measured within 30 days prior to the application.

NEW SECTION SECTION 17. There is added to K.C.C. 21 a new section to read as follows:

Notification requirements. Notification of a permit application shall be given to adjacent property owners within a 500 foot radius and the local community council. The area within which mailed notice is required shall be expanded to include at least 20 different owners in rural or lightly inhabited areas or in other appropriate cases to the extent the division determines is necessary. The standards of public notice and posting of property shall be pursuant to K.C.C. 21.62.070.

NEW SECTION SECTION 18. There is added to K.C.C. 21 a new section to read as follows:

NIER compliance criteria. The department of public health

shall consider the following criteria in determining compliance with section 10 of this ordinance:

A. The number and location of points at which levels have been determined to exceed NIER standards;

B. The duration of exposure to NIER levels above the standard;

C. The extent by which the levels measured at such points exceed the standards established by this ordinance; and

D. The relative contribution of individual sources in a multiple source environment.

NEW SECTION SECTION 19. There is added to K.C.C. 21 a new section to read as follows:

NIER enforcement. A. The department of public health shall be responsible for the enforcement of the provisions of section 10 of this ordinance in accordance with K.C.C. 23. The department director shall allow no more than 10 days to elapse from the date of a violation before corrective action is commenced. If this deadline cannot be met, the director shall issue a stop work order.

B. If the approved NIER standard is exceeded in an area where there are multiple users and transmission equipment, all users shall share in the NIER reductions, scaled proportionally to their current discharges.

NEW SECTION SECTION 20. There is added to K.C.C. 21 a new section to read as follows:

Periodic review of NIER standard. The department of public health shall review the county approved NIER standard every three years and report to the chair of the council on whether it should be changed.

NEW SECTION SECTION 21. There shall be added to K.C.C. 21 a new section to read as follows:

Federal or state regulation.

A. If state regulations establish a NIER exposure standard which is more restrictive than the county standard, the state standard shall automatically become effective.

B. If such state standards are intended to preempt local enforcement with respect to specific sections of this ordinance, said sections shall automatically become ineffective.

C. Application of the provisions of this ordinance shall be subject to any rule, regulation, order or decision of any state or federal court or government agency with which such communication facility is obligated to comply.

NEW SECTION. SECTION 22. There is added to KCC 21.04 a new section to read as follows:

Communication facility. "Communication facility" means a site developed primarily for the transfer of voice or data through radio transmissions. Such sites typically require the construction of transmission structures to which transmission equipment is attached or in which such equipment is housed.

NEW SECTION. SECTION 23. There is added to KCC 21.04 a new section to read as follows:

Communication facility - major. "Major communication facility" means a communication facility for transmission of:

A. UHF and VHF television signals; or

B. FM or AM radio signals.

NEW SECTION. SECTION 24. There is added to KCC 21.04 a new section to read as follows:

Communication facility - minor. "Minor communication facility" means a communication facility for transmission and/or reception of:

A. Two-way and/or citizen band (CB) radio signals;

B. Point-to-point microwave signals;

C. Cellular radio signals;

D. Signals through FM radio translators; or

E. Signals through FM radio boosters under 10 watts effective radiated power (ERP)

NEW SECTION. SECTION 25. There is added to KCC 21.04 a new section to read as follows:

Consolidation. "Consolidation" means the relocation to a consolidated transmission structure of the main transmit antennas of two or more FCC broadcast licensees which prior to such relocation utilized transmission structures located within a 1500 foot radius of the center of the consolidated transmission structure to support their main transmit antennas.

NEW SECTION. SECTION 26. There is added to KCC 21.04 a new section to read as follows:

Earth station. "Earth station" means a communication facility which transmits and/or receives signals to and from an orbiting satellite using satellite dish antenna(e).

NEW SECTION. SECTION 27. There is added to KCC 21.04 a new section to read as follows:

Effective radiated power. "Effective radiated power" the product of the antenna power input and the numerical equal antenna power gain.

NEW SECTION. SECTION 28. There is added to KCC 21.04 a new section to read as follows:

Non-ionizing electromagnetic radiation (NIER). "Non-ionizing electromagnetic radiation" means electromagnetic radiation of low photon energy unable to cause ionization.

NEW SECTION. SECTION 29. There is added to KCC 21.04 a new section to read as follows:

Radio. "Radio" means a generic term referring to the transmission of an electromagnetic signal through space.

NEW SECTION. SECTION 30. There is added to KCC 21.04 a new section to read as follows:

Transmission equipment. "Transmission equipment" means

equipment such as antennae and satellite or point-to-point microwave dishes which transmit or receive radio signals.

NEW SECTION. SECTION 31. There is added to KCC 21.04 a new section to read as follows:

Transmitter building. "Transmitter building" means a building used to contain transmission equipment.

NEW SECTION. SECTION 32. There is added to KCC 21.04 a new section to read as follows:

Transmission structure. "Transmission structure" means a structure constructed on the ground or on top of another structure intended to support transmission equipment or function as an antenna for AM radio or an earth station satellite dish antenna(e). The term does not include brackets, platforms, or other apparatus which mount transmission equipment on transmission structures, buildings, or other structures.

NEW SECTION. SECTION 33. There is added to KCC 21.04 a new section to read as follows:

Transmission structure - consolidated. "Consolidated transmission structure" means a single transmission structure which is designed to support the main transmit antennas for two or more FCC broadcast licensees.

SECTION 34. Ordinance 3144, Section 3 as amended, and K.C.C.
21.08.030 is hereby amended to read as follows:

Permitted uses - Accessory residential. The following accessory uses only are permitted in an RS zone when a residential use as permitted in K.C.C. 21.08.020 has been established on the subject property:

A. Accessory living quarters;

B. Accessory dwelling, provided:

1. The accessory unit is within the same building as the principal residence,

2. The accessory unit floor area does not exceed fifty percent of the combined total area of the principal residence and the accessory unit,

3. The house must be owner-occupied,

4. The principal residence and the accessory unit, and occupancy thereof, must comply with K.C.C. Chapter 16.04,

5. Garage space may be converted only if the same number of covered parking spaces are provided elsewhere on the property,

6. One off-street parking space in addition to that required for a single family dwelling shall be provided,

7. The total number of people who may occupy principal residence and the accessory unit, together, shall not exceed the number of people who may occupy a one-family dwelling;

C. Accesory strucures, including storage buildings, and private garages designed to accommodate not more than four cars;

D. Except as provided in K.C.C. 11.04.060 small animals (household pets) not to exceed three in any combination thereof, when kept on the same lot as the residence of the owners of such pets;

E. Lodgers, limited to two;

F. Private docks (one only per dwelling unit) and mooring facilities for the sole use of occupants of the premises to accommodate private noncommercial pleasure craft. Docks and moorings shall be accessory to the primary use on the property to which they are contiguous, provided:

1. Structures shall conform to the applicable provisions of the Shoreline Management Master Program,

2. No part of the structure shall extend more than sixteen feet above the mean high water level,

3. No structure shall be located closer to a property side line or property side line extended, then fifteen feet,

except that docks may abut property lines for the common use of adjacent property owners, when mutually agreed to by the property owners in a contract recorded with the King County division of records and elections, of which a copy must accompany an application for a building permit,

4. The total area of moorage shall not exceed six hundred square feet,

5. Covered moorages shall abut upon the natural shoreline,

6. Such structure shall not have a width greater than fifty percent of the width of the lot at the natural shoreline upon which it is located,

7. Any boat using such moorage shall not be used as a place of residence when so moored;

G. Foster family day care home, twenty-four hours;

H. Greenhouse, private and noncommercial, for propagation and culture only, with no sales from the premises permitted;

I. ((~~Radio tower, amateur;~~)) Communication facility pursuant to the provisions of sections 2 through 19 of this ordinance;

J. Swimming pools and other recreational facilities for the sole use of occupants of premises and their guests;

K. Day nurseries, provided:

1. A maximum of twelve children are cared for in any twenty-four hour period, provided further that the facility shall conform to the occupancy requirements of Chapter 8 of the Uniform Building Code as adopted by King County whenever more than six children are cared for at one time.

2. Outdoor play areas shall be provided with a minimum of seventy-five square feet in area for each child using the area at one time, and shall be completely enclosed by a solid barrier such as a berm, wall or fence, with no openings except for gates,

and having a minimum height of six feet, to minimize visual and noise impacts and prevent trespassing on adjacent residentially classified properties.

3. Play equipment shall not be located closer than twenty feet to any property lines.

4. The hours of operation may be restricted to assure compatibility with surrounding development;

L. Home occupation; provided the home occupation:

1. Is carried on exclusively by a member or members of a family residing in the dwelling unit,

2. Is clearly incidental and secondary to the use of the property for dwelling purposes with the floor area devoted to the home occupation not exceeding twenty percent of the living area of the dwelling unit,

3. Has no display or sign not already permitted in the zone, except that a home occupation which is conducted by a person who is medically certified as permanently disabled, and which is located on a state highway, may have a sign no larger than 24 square feet,

4. Has no outside storage nor other exterior indication of the home occupation or variation from the residential character of the property,

5. Does not require truck delivery or pickup, nor the installation of heavy equipment, large power tools or power sources not common to a residential dwelling,

6. Does not create a level of noise vibration, smoke, dust, odors, heat or glare beyond that which is common to a residential area,

7. Does not create a level of parking demand beyond that which is normal to a residential area,

8. Does not include automobile, truck or heavy equipment repair, body work or painting; nor parking or storage of heavy

equipment including trucks of over one-ton load capacity; nor storage of building materials such as lumber, plasterboard, pipe, paint and the like, for use on other premises;

9. All sales shall be an incidental use;

M. One nameplate not exceeding two square feet in area containing the name of the occupant of the premises;

N. Aircraft hangar, provided:

1. No aircraft sales, service, repair, charter or rental shall be permitted on the premises; nor shall storage of any aircraft on the premises for such purposes be permitted.

2. Only one single or twin-engined noncommercial aircraft (excluding helicopters) shall be accommodated on the premises.

3. No aviation fuel except that contained in the tank or tanks of the aircraft itself shall be stored on the premises.

4. No hangar shall be allowed except on lots which abut, or have a legal access which is not a county right-of-way to a landing field in conformance with K.C.C. Chapter 21.44.

5. No hangar constructed pursuant to this section shall exceed twenty feet in height above average grade, nor have a gross area exceeding three thousand square feet;

O. Beehives, limited to four, provided:

1. Colonies shall be maintained in movable-frame hives at all times.

2. Adequate space shall be maintained in each hive to prevent overcrowding and swarming.

3. Colonies shall be requeened following any swarming or aggressive behavior.

4. All colonies shall be registered with the county agricultural extension agent prior to April 1st of each year; state registration form is acceptable for use with the county.

5. Hives shall not be located within twenty-five feet of any property line, except:

a. When situated eight feet or more above adjacent ground level; or

b. When situated less than six feet above adjacent ground level and behind a solid fence or hedge six feet in height parallel to any property line within twenty-five feet of the hive and extending at least twenty feet beyond the hive in both directions.

6. Bees living in trees, buildings, or any other space except in movable-frame hives; abandoned colonies; or diseased bees constitute a public nuisance, and shall be abated as set forth in K.C.C. 21.69.

7. Lots containing more than fifteen thousand square feet, but less than thirty-five thousand square feet of area may have up to sixteen beehives.

8. Lots containing thirty-five thousand square feet or more shall be limited to fifty beehives.

P. Specialized instruction schools, provided:

1. Instructional courses are limited to a maximum of four students per session.

2. Parking, beyond that required for residential uses on the site, shall be provided as in K.C.C. 21.50.040, Parking spaces required.

SECTION 35. Ordinance 3144, Section 6, and K.C.C. 21.08.060 is hereby amended to read as follows:

Conditional uses. In an RS zone the following conditional uses are permitted, subject to the restrictions of this section, the off-street parking requirements, landscaping requirements, and the general provisions and exceptions set forth in this title beginning with Chapter 21.46, Chapter 21.58, and the provisions of the King County shoreline management master program, where applicable:

A. Recreational facilities, community noncommercial,

including clubhouse facilities, provided:

1. Any building or structure on the site shall maintain a distance not less than twenty-five feet from any abutting R, S or G classified property.

2. Any lights provided to illuminate any building or recreational area shall be so arranged as to reflect the light away from any premises upon which a dwelling unit is located.

3. The site shall be located upon, or have adequate access to a public thoroughfare.

B. Boat moorages for pleasure craft only in connection with community and noncommercial recreational facilities as set forth in this section, whether the moorage is publicly or privately owned; provided:

1. No boat sales, service, repair, boat charter or rental shall be permitted on the premises.

2. The deck of any pier shall be no more than five feet above high water level.

3. Onshore toilet facilities shall be provided.

4. Boats using such moorage facilities shall not be used as a place of residence.

5. No overhead wiring shall be permitted on piers or floats except within covered moorage structures.

6. All covered structures over water shall abut upon the shore and be at least forty feet apart when placed side by side. When covered structures are placed end to end or side to end, one of the structures shall abut upon the shore, and the structures shall be at least fifteen feet apart.

7. No covered structures over water shall be permitted to extend out from shore a distance greater than fifty percent of the maximum permitted distance from shore of a pier on the subject premises, but in no case a distance

of more than fifty feet from shore.

8. No pier, including finger piers, shall occupy more than ten percent of the water area of any lot upon which the same is built, nor shall the total area of covered structures over water occupy more than twenty percent of the water area of such lot.

9. All covered structures over water under one ownership shall be built in a uniform manner and design and no point in the roof of such structure shall be higher than sixteen feet above high water in fresh water and no floating moorage located in fresh or tidal water shall have a structure higher than sixteen feet from the water line.

10. The roofs of covered moorage shall contain no more than seventy-two hundred square feet of area in any one unit, and such roofs shall not be supported directly by extended piling.

11. Side walls on covered structures shall not exceed fifty percent of the area of any three sides and shall be of rigid or semirigid material and shall cover from external view all roof bracing.

C. Day nurseries when more than twelve children are to be cared for at one time, subject to the following provisions which the zoning adjustor may waive or modify when circumstances warrant:

1. A minimum site area of 7,200 square feet is required for thirteen children, and an additional 400 square feet of site area is required for each additional child to be cared for.

2. The facility shall conform to the occupancy requirements of Chapter 8 of the Uniform Building Code as adopted by King County.

3. Direct access to a designated and developed arterial street shall be required.

4. A minimum of one off-street parking space for each ten

children cared for plus one for each employee on duty shall be required, provided no parking shall be located within required yards.

5. Buildings, structures and landscaping shall be of a character which is appropriate for the area.

6. Outdoor play areas shall be provided with a minimum of seventy-five square feet in area for each child using the area at one time, and shall be completely enclosed by a solid barrier such as a berm, wall or fence, with no openings except for gates, and having a minimum height of six feet to minimize visual and noise impacts and prevent trespassing on adjacent residentially classified properties.

7. Play equipment shall not be located closer than twenty feet to any property lines.

8. The hours of operation may be restricted to assure compatibility with surrounding development.

9. One sign not exceeding two square feet in area is permitted.

D. Seaplane hangers, provided:

1. No aircraft sales, service, repair, charter or rental shall be permitted on the premises, nor shall storage of any aircraft on the premises for such purposes be permitted.

2. Only one single-engined or twin-engined private noncommercial seaplane (excluding helicopters) shall be accommodated on the premises.

3. No aviation fuel except that contained in the tank or tanks of the seaplane itself shall be stored on the premises.

4. Seaplane hangars shall conform to all applicable zoning and shoreline management regulations governing moorage facilities and covered boathouses.

5. No landing fields or other facility for landbased

aircraft shall be allowed, except as an unclassified use in conformance with Chapter 21.44.

E. Communication facility subject to sections 2 through 19 of this ordinance.

SECTION 36. Ordinance 3144, Section 7 as amended, and K.C.C. 21.08.070 is hereby amended to read as follows:

Utilities. Public utilities shall be permitted in an RS zone as follows, subject to the provisions of the King County shoreline management master program where applicable, except that public utility facilities permitted by Section 21.46.140 shall not be affected by this section:

A. Public utility facilities necessary for the transmission and distribution of services for the area when the facilities are located underground below the natural grade of the site; provided, however, that surface-mounted transformers, telephone terminals and metering devices less than five feet in height required in connection with underground services are permitted above ground.

B. Public utility facilities, such as telephone exchanges, sewage or water pumping stations, electrical distribution substations, necessary for the distribution of services, ((~~including accessory microwave transmission facilities and towers,~~)) are permitted above ground, but not including business offices, warehousing, storage buildings or yards, service yards, sewage treatment plants or bulk gas storage or the like, subject to the following minimum standards:

1. Any equipment or structure except architectural screens and fences shall observe a setback of one foot for each one foot the equipment or structure rises above the grade, but in no case less than twenty feet from any property line.

2. When security fences are used, they shall be supplemented with base plantings of evergreen shrubs or trees, or

climbing evergreen material on the fences or wood slats woven into the fence so as to minimize the industrial character of such fences.

3. An appropriate area surrounding the installation shall be landscaped and maintained with paving, shrubs and ground cover consistent with surrounding residential standards.

4. When the facility includes bulky structures such as water towers or standpipes, the landscaping shall include trees, either natural or planted, of such size as will partially screen and effectively break up the massive appearance of such structures.

5. Landscaping shall be planted according to accepted practice in good soil and maintained in good condition at all times. Landscaping shall be planted as a yard improvement at or before the time of completion of the first structure or within a reasonable time thereafter, considering weather and planting conditions.

6. The permissible sound level measured at any common property line with R, S or G classified property shall normally not exceed sixty decibels when measured on the A scale by a Type 1 or Type 2 sound level meter as specified in American National Standards Institute Specification S 1.4-1971.

7. Site plans, elevation and landscape plans shall be submitted and approved by the building and land development division prior to the issuance of a building permit. The building and land development division may require the posting of a surety bond guaranteeing to the county the installation and improvement of the site in accordance with the approved screening and landscape plans in an amount estimated to be equal to the cost of such screening and landscaping.

C. Communication facility subject to sections 2 through 19 of this ordinance.

SECTION 37. Ordinance 3594, Section 3 and K.C.C. 21.22.030 is hereby amended to read as follows:

Permitted uses - Nonagricultural. In an A zone, the following nonagricultural and conditional uses only are permitted and as hereinafter specifically provided and allowed by this chapter, if located on a legal lot, subject to the off-street parking requirements, loading and unloading requirements, landscaping requirements, the general provisions and exceptions set forth in this title beginning with Chapter 21.46, and subject to the provisions of the King County shoreline management master program where applicable:

A. A one-family dwelling and accessory buildings and uses; provided, that if the dwelling is factory-built housing or a mobile home, it must be certified by the State of Washington, and if the dwelling is a mobile home, it must also meet on-site requirements contained in K.C.C. 21.09;

B. Housing facilities to accommodate agricultural employees and their families employed by the owner of the premises; provided such facilities are permitted only on holdings containing ten acres or more; and provided further, that such housing facilities shall be considered accessory to the main dwelling but shall conform to the provisions of this classification pertaining to required yards and open spaces for dwellings;

C. Marketing of agricultural and dairy products raised on the premises; provided only one stand shall be permitted on the premises and such stand shall not contain more than five hundred square feet of floor area and shall not be located in any required yard or open space on the premises;

D. Public utility facilities such as telephone exchanges, sewage or water pumping stations, electrical distribution substations, water storage reservoirs or tanks necessary for the distribution and transmission of services for the area including

accessory microwave transmission facilities and towers;

E. Schools and churches;

F. Recreational facilities, community noncommercial, including clubhouse facilities, shall be permitted as conditional uses, provided:

1. Any building or structure on the site shall maintain a distance not less than twenty-five feet from any abutting R, S or G classified property,

2. Any lights provided to illuminate any building or recreational area shall be so arranged as to reflect the light away from premises upon which a dwelling unit is located,

3. The site shall be located upon or have adequate access to a secondary arterial;

G. Signs as follows:

1. One single-faced unlighted identification sign not exceeding twelve square feet in area; provided, such sign shall not be located in any required yard or open space on the premises,

2. One unlighted double-faced sign, not exceeding six square feet of area per face, pertaining only to the sale, lease or hire of only the particular building, property or premises upon which displayed;

H. Unclassified uses as provided in Chapter 21.44, consistent with the purpose of this chapter as stated in Section 21.22.010, and excluding airports and heliports;

I. Plants for processing agricultural and dairy products, and retail sales of feed, seed, fertilizers, fencing materials, apparel, or such other supplies that are directly related to the agricultural production, and specifically excluding powered equipment and related implements, trailers and related implements; and all uses are subject to the issuance of a conditional use permit; provided the following minimum conditions are

conformed to:

1. The number of employees involved and the physical scale is such that there is no substantial traffic involved and the building intensity and character is consistent with the surroundings,

2. There are adequate facilities provided to handle sewage and water needs and the processes do not violate air or water pollution standards,

3. The use is not located within a one-hundred-year floodplain. Expansion of any existing facilities in the floodplain shall be limited to structural alterations and increases in floor area required by law for health and safety reasons;

J. Home occupations; provided the home occupation:

1. Is carried on exclusively by a member or members of a family residing in the main dwelling unit on the premises,

2. Is clearly incidental and secondary to the use of the property for agricultural purposes,

3. Has no display or sign not already permitted in the zone.

4. Has no outside storage nor other exterior indication of the home occupation or variation from character of the area,

5. Does not require truck delivery or pickup, nor the installation of heavy equipment, large power tools or power sources not common to an agricultural area,

6. Does not create a level of noise vibration, smoke, dust, odors, heat or glare beyond that which is common to an agricultural area,

7. Does not create a level of parking demand beyond that which is normal to an agricultural area, and

8. All sales shall be an incidental use.

K. Communication facility subject to sections 2 through 19 of this ordinance.

SECTION 38. Ordinance 7636, Section 2, and K.C.C. 21.23.020 is hereby amended to read as follows:

Permitted uses. In an A-10 or A-35 zone, the following uses only are permitted:

A. Growing and harvesting agricultural crops, as well as the structures necessary for these activities, which includes structures for propagation, equipment, supplies and storage;

B. Keeping and raising of livestock and small animals, including all kinds of stables regardless of size but, not including commercial kennels;

C. Processing of agricultural products, provided the products are raised on-site;

D. Marketing of agricultural products raised on the premises, provided that the square footage for a farm stand not including storage areas shall not exceed five hundred square feet of floor area, and customer parking is provided on-site;

E. Housing for one family and accessory buildings and uses as enumerated in K.C.C. 21.08.030;

F. Accessory housing in separate structures to accommodate agricultural workers and their families employed on the premises, provided:

1. Such facilities are only permitted on holdings containing ten acres or more;

2. These housing facilities shall not be rented or leased to the public at large;

3. The sewage disposal and water supply are approved by the department of public health;

4. These housing facilities are accessory to the main dwelling and cannot be subdivided and made into a primary dwelling;

5. Only one accessory dwelling unit is permitted on

parcels between ten and twenty acres in size. Two accessory dwelling units are permitted on parcels in excess of twenty acres;

G. Home occupations, provided;

1. The home occupation is clearly incidental and secondary to the use of property for agricultural purposes;

2. The home occupation has no display or sign not already permitted in the zone;

3. The home occupation has no outside storage nor other exterior indication of the home occupation or variation from character of the area;

4. The home occupation does not require the installation of heavy equipment, large power tools or power sources not common to an agricultural area;

5. The home occupation does not create a level of noise vibration, smoke, dust, odors, heat or glare beyond that which is common to an agricultural area;

6. The home occupation does not create a level of parking demand beyond that which is normal to an agricultural area;

7. On-site sales shall be incidental to the main purpose of the home occupation;

8. The home occupation does not involve the use of any type of hazardous materials for which the Uniform Fire Code would require the issuance of a permit;

9. Any required sewer or water permits are obtained from Seattle-King County department of public health.

10. Occasional and temporary employees may be permitted by an administrative conditional use permit issued for a cottage industry.

H. Agricultural Research farms.

I. Communication facility subject to sections 2 through 19 of this ordinance.

SECTION 39. Ordinance 7636, Section 3 and K.C.C. 21.23.030 is hereby amended to read as follows:

Unclassified uses. Only the following unclassified uses may locate in an agricultural classification pursuant to the issuance of an unclassified use permit as provided in Chapter 21.60:

A. Jail farms or honor farms, publicly owned and used for rehabilitation of prisoners;

B. Booster stations or conversion plants with the necessary buildings, apparatus or appurtenances incident thereto of public utilities or utilities operated by mutual agencies, provided the applicant demonstrates that the proposed use should be sited in an agricultural area. Distribution mains are permitted without an unclassified use permit;

C. A farm store in excess of 2500 square feet, subject to all of the provisions for a conditional use permit for a farm store((.)); and

D. Communication facility, subject to sections 2 through 19 of this ordinance.

SECTION 40. Ordinance 7636, Section 4, and K.C.C. 21.23.040 is hereby amended to read as follows:

Conditional uses. The following conditional uses only may locate in an agricultural classification pursuant to the issuance of a conditional use permit as provided in Chapter 21.58:

A. Marketing, through a farm store, of agricultural products raised on and off premises, provided the following minimum standards are met:

1. The retail sales floor area of the farm store shall not exceed 2,500 square feet;

2. No more than 40 percent of the average annual gross sales of agricultural products sold through the store over a five year period shall be derived from products not grown or produced in King County. At the time of the initial

application, the applicant shall submit a reasonable projection of the source of product sales;

3. Sales through a farm store shall be limited to the sale of agricultural products and plants only;

4. Storage areas in excess of the retail sales area may be included in the farm store structure or in any accessory building;

5. Parking areas shall be provided at the ratio of one stall per 200 square feet of retail space;

6. Hours of operation shall be limited to the hours from 7:00 a.m. to 9:00 p.m. during the months of May through September and 7:00 a.m. to 7:00 p.m. during the months of October through April. Outside lighting is permitted, provided no off-site glare is allowed;

7. Noncontiguous lands within King County may be assembled by an individual farmer or group of farmers for the purposes of establishing a source of local products to be sold in a farm store on one of the properties.

B. Commercial use of buildings listed on the National Register as an historic site or designated as a King County landmark, provided:

1. Gross floor area of the building additions or new buildings involved in the conversion shall not exceed twenty percent of the gross floor area of the historic or landmark buildings;

2. Any construction required for conversion which affects significant features of the property protected pursuant to Ordinance 4828 and K.C.C. 20.62 shall require certification of appropriateness from the King County landmarks commission;

C.((~~Radio, microwave or television transmitters, towers and appurtenances, provided:~~))

((~~1. Sufficient setbacks or easements are provided to~~

~~protect improvements on adjacent property in the event of tower collapse;~~))

((~~2. Public access to towers is precluded;~~))

((~~3. Vehicle access and utility corridors are shared whenever possible;~~)) Communication facility subject to sections 2 through 19 of this ordinance.

D. Cottage industries, provided the following conditions are conformed to:

1. The cottage industry shall be incidental to the use of the property for agricultural purposes and shall be less than fifty percent of the living area of the main dwelling. This fifty percent square footage limitation includes outdoor assembly and storage areas but not required parking areas:

2. The following uses shall not be allowed:

a. Any activity which might result in excessive noise, smoke, dust, odors, heat or glare beyond that which is common to an agricultural area. The proposed use shall conform to the maximum permissible sound levels under K.C.C. Chapter 12.88. The zoning adjustor may require an applicant to provide sound level tests demonstrating such conformance;

b. Use ((~~of~~)) or manufacture of products or operations which are dangerous in terms of risk of fire, explosion, or hazardous emissions;

c. Any other use deemed incompatible with an agricultural area, subject to the review of the zoning adjustor;

3. Landscaping shall be required to screen parking areas and outside storage from the view of adjacent landowners and county roads;

4. Increased setbacks or additional screening may be established by the zoning adjustor to ensure that any proposed structure is compatible with the surrounding residential or agricultural area;

5. Any required sewer and water permits are obtained from Seattle-King County department of public health;

6. All sales directly from the premises shall be an incidental use;

7. The allowable size of equipment used by the cottage industry shall be subject to the review of the zoning adjustor;

((B)) E. Bed and breakfast guesthouse provided:

1. The bed and breakfast guesthouse operations shall be located only on the premises of the permanent residence of the operator(s);

2. The guesthouse operation shall be compatible with the agricultural character of the area;

3. One off-street parking space shall be provided for each guestroom plus the required off-street parking spaces for the dwelling. This parking area shall not be located within any required yard. Landscaping may be required to screen parking areas from the view of adjacent properties and from public roads;

4. Serving meals to paying guests shall be limited to overnight lodgers;

5. The wastewater disposal facility and the domestic water supply serving the guesthouse shall be subject to the approval of the Seattle-King County department of public health;

6. Approval of any food service facilities must be obtained from the Seattle-King County department of public health.

7. The number of persons accommodated per night shall not exceed five except that a structure which satisfies the standards of the Uniform Building Code as adopted by King County for R-1 occupancies may accommodate up to ten persons per night;

((E)) F. Public parks, provided the parks are designed to prevent trespass to adjacent farms through appropriate screening, barriers and other means;

((F)) G. Fire stations, provided that the use is shown to be necessary in this zone.

SECTION 41. Ordinance 4303, Section 3 and K.C.C. 21.25.020 is hereby amended to read as follows:

Permitted uses. In a G-5 zone, the following uses only are permitted, subject to the off-street parking requirements and other general provisions and exceptions set forth in this title beginning with Chapter 21.46:

A. A one-family dwelling and accessory buildings and uses; provided, that if the dwelling is a factory built unit or a mobile home, it must be certified by the State of Washington, and if the dwelling is a mobile home, it must also meet on-site permit requirements contained in K.C.C. 21.09 as now or hereafter amended;

B. On parcels having an area of 35,000 square feet or greater but less than five acres the following uses are permitted:

1. Agricultural crops,

2. Accessory buildings and uses, including the following:

a. Private stables, provided such buildings or structures shall not be located closer than thirty-five feet to any boundary line or closer than forty-five feet to any building containing a dwelling unit or accessory living quarters on the same premises; and provided further, that there shall be no open-air storage of manure, hay, straw, shavings or similar organic material closer than thirty-five feet to any property boundary line or closer than forty-five feet to any dwelling unit or accessory living quarters on the same premises;

b. Green houses provided no retail sales are permitted on the premises for parcels of less than one acre;

c. Marketing of agricultural products produced on-site

or on immediately adjacent properties, provided only one stand is to be used for such purposes, and such stand shall not have more than three hundred square feet of floor area, and shall not be located in any required yard or open space;

3. Livestock, provided:

a. No more than one horse, cow, steer, or swine or five sheep or goats, not counting sucklings, for each one-half acre of the total site area shall be permitted.

b. Fee boarding of other's livestock shall be accessory to a residence on the subject property and the total number of animals, including those owned by the occupants of the premises shall not exceed one horse, cow, steer, or swine or five sheep or goats for each one-half acre of the site.

c. Any building, pen or structure used to house, confine or feed such animals shall not be located closer than thirty-five feet to any boundary property line nor closer than forty-five feet to any building containing a dwelling unit or accessory living quarters on the same premises.

d. Swine shall be permitted only on a site with a minimum area of three acres which shall not be further sub-divided, and any building, pen or structure used to house, confine or feed swine shall not be located closer than one hundred feet to any property line nor closer than forty-five feet to any building containing a dwelling unit or accessory living quarters on the same premises.

4. Raising of poultry, chicken, squab and rabbits, provided:

a. No more than thirty in total of such fowl or animals per acre may be kept on the premises.

b. Any birds kept on the premises shall be confined within an aviary.

c. Any building, pen, aviary or structure used to house

or contain such fowl and animals shall not be located closer than thirty-five feet to any boundary property line of the premises, or closer than forty-five feet to any building containing a dwelling unit or accessory living quarters on the same premises.

5. Raising of hamsters, nutria and chinchilla for commercial purposes provided ((~~,~~)):

a. No more than one hundred of such animals per acre may be kept on the premises.

b. Any buildings, pens, cages or structures used to contain or house such animals shall not be located closer than thirty-five feet to any building containing a dwelling unit or accessory living quarters on the same premises.

6. Signs, as follows:

a. One unlighted identification sign not exceeding two square feet in area containing the name of the occupant of the premises;

b. One unlighted double-faced sign not exceeding six square feet of area per face, pertaining only to the sale, lease or hire of only the particular building, property or premises upon which displayed;

7. Rental stables, subject to a conditional use permit, provided the site must be large enough to contain the riding area or trail system.

C. On parcels having 5 acres or more but less than 10 acres all of the uses permitted in KCC 21.25.020B plus the following uses:

1. Fishing ponds (commercial), but excluding restaurants;

2. Forest crops, growing and harvesting;

3. Horticultural nurseries;

4. Small animal farms, including mink and fox farms; provided any building, pen, cage or structure used to contain, house, confine or feed such animals shall not be located closer

than one hundred fifty feet to any building containing a dwelling unit or accessory living quarters on the same premises;

5. Small animal hospitals and clinics, provided the portion of the building or structure in which animals are kept or treated is sound-proofed; all run areas are completely surrounded by an eight-foot solid wall; the animal runs shall be surfaced with concrete or other impervious materials; there shall be no burning of refuse or dead animals on the premises; drainage shall be away from adjoining properties;

6. Slaughtering and dressing of animals or fowl raised on the premises, accessory to a residence; provided any building, structure or area used for such purposes shall not be closer than seventy-five feet to any boundary property line of the premises, or closer than forty-five feet to any building containing a dwelling unit or accessory living quarters on the same premises.

D. On parcels having 10 acres or more, all of the uses permitted in KCC 21.25.020B and C plus the following structures and uses are permitted:

1. Barns, silos and other structures necessary for farming and ranching practices, provided said structures shall not be located closer than seventy-five feet to any boundary property line of the premises or any building containing a dwelling unit or accessory living quarters on the same premises;

2. Beehives, without limit on number, provided:

a. Colonies shall be maintained in movable-frame hives at all times,

b. Adequate space shall be maintained in each hive to prevent overcrowding and swarming,

c. Colonies shall be requeened following any swarming or aggressive behavior,

d. All colonies shall be registered with the county agricultural extension agent prior to April 1st of each year,

e. Hives shall not be located within twenty-five feet of any property line except:

(1) When situated eight feet or more above adjacent ground level or

(2) When situated less than six feet above adjacent ground level and behind a solid fence or hedge six feet in height to any property line within twenty-five feet of the hive and extending at least twenty feet beyond the hive in both directions;

3. Dairies, livestock, poultry and small animals, provided:

a. Any building, pen, milking shed, cage, aviary, animal run, or area used to contain, house or feed such animals or fowl, other than railroad loading pens, shall not be located closer than seventy-five feet to any boundary property line of the premises or any building containing a dwelling unit or accessory living quarters on the same premises,

b. Any open-air storage of manure, hay, straw, shavings or similar organic materials shall maintain a distance of not less than thirty-five feet from any boundary property line and a distance of not less than forty-five feet from any building containing a dwelling unit or accessory living quarters on the same premises;

4. Forest products, growing and harvesting, including processing of locally harvested crops using portable equipment;

5. Public and private stables; provided:

a. Any stable or barn shall not be located closer than seventy-five feet to any boundary property line, nor closer than forty-five feet to any building containing a dwelling unit or accessory living quarters on the same premises,

b. Any corrals, exercise yards or arenas shall maintain a distance of not less than thirty-five feet from any boundary

property line and a distance of not less than forty-five feet from any building containing a dwelling unit or accessory living quarters on the same premises,

c. One unlighted sign, up to sixteen square feet in size, shall be permitted;

6. Pasturing and grazing;

7. Housing facilities to accommodate agricultural employees and their families employed by the owner of the premises; provided such facilities are permitted only on holdings containing ten acres or more; and provided further, that such housing facilities shall be considered accessory to the main dwelling but shall conform to the provision of this classification pertaining to required yards and open spaces for dwellings;

8. Marketing of agricultural and dairy products raised on the premises; provided only one stand shall be permitted on the premises and such stand shall not contain more than five hundred square feet of floor area and shall not be located in any required yard or open space on the premises;

9. Retail sales of feed, seed or fertilizers, and plants for processing agricultural and dairy products, both subject to the issuance of a conditional use permit; provided the following minimum conditions are conformed to:

a. The number of employees involved and the physical scale is such that there is no substantial traffic involved and the building intensity and character is consistent with the surroundings,

b. There are adequate facilities provided to handle sewer and water needs and the processes do not violate air or water pollution standards,

c. The use is not located within a one hundred-year floodplain. Expansion of any existing facilities in the floodplain shall be limited to structural alterations and increases in

floor area required by law for health and safety reasons:

10. Home occupations; provided the home occupation:

a. Is carried on exclusively by a member or members of a family residing in the main dwelling unit on the premises,

b. Is clearly incidental and secondary to the use of the property for agricultural purposes,

c. Has no display or sign not already permitted in the zone,

d. Has no outside storage nor other exterior indication of the home occupation or variation from character of the area,

e. Does not require truck delivery or pickup, nor the installation of heavy equipment, large power tools or power sources not common to an agricultural area,

f. Does not create a level of noise vibration, smoke, dust, odors, heat or glare beyond that which is common to an agricultural area,

g. Does not create a level of parking demand beyond that which is normal to an agricultural area, and

h. All sales shall be an incidental use.

E. Public utility facilities such as telephone exchanges, water pumping stations, electrical distribution substations, water storage reservoirs or tanks necessary for the distribution and transmission of services for the area including accessory microwave transmission facilities and towers;

F. Schools and churches;

G. Libraries and parks, publicly owned and operated, subject to the provisions of K.C.C. 21.08.040F;

H. Any accessory use set forth in K.C.C. 21.08.030 and K.C.C. 21.08.050, subject to the provisions contained therein;

I. Recreational facilities, community noncommercial, including clubhouse facilities, subject to the issuance of a conditional use permit, provided:

1. Any building, structure, or parking area on the site shall maintain a distance not less than twenty-five feet from any abutting R, S or G classified property.

2. Any lights provided to illuminate any building or recreational area shall be so arranged as to reflect the light away from any premises upon which a dwelling unit is located.

3. The site shall be located upon, or have adequate access to a public thoroughfare.

J. Specialized instruction schools provided:

1. The lot shall have a minimum lot size of 2 1/2 acres.

2. The specific standards set forth in K.C.C. 21.44.030 R. are met.

K. Unclassified uses as provided in Chapter 21.44, only when consistent with the purpose of this chapter and excluding commercial establishments and enterprises as defined by K.C.C. 21.44.030C.

L. Communication facility, subject to sections 2 through 19 of this ordinance.

SECTION 42. Resolution 25789, Section 1301, and K.C.C. 21.26.020 is hereby amended to read as follows:

Permitted uses. Any of the following types of uses which can meet the following standards are permitted and allowed by this classification, subject to the limitations set forth herein:

A. Any on-premises retail enterprise dispensing food or commodities (but not including automobiles, boats, trailers and heavy-duty equipment) and which may involve only incidental and limited fabrication or assembly of commodities;

B. Business offices and any type of use rendering professional services or personal services to the individual, provided:

1. The service does not involve keeping the person receiving the service overnight on the premises,

2. The service does not include selling alcoholic beverages for on-premises consumption unless accessory to restaurant,

3. The services does not involve in whole or in part the providing of recreation, recreational facilities or entertainment other than moorage for private pleasure craft,

4. The professional service does not include kennels or small animal hospitals or clinics;

C. Any public utility installation relating directly to local distribution of services including switching and transmission stations but not including warehoused, service yards or the like unless otherwise permitted by this title;

D. Public off-street parking facilities, whether publicly or privately owned and operated, provided any area so used shall not be used for a vehicle, trailer or boat sales area or for the accessory storage of such vehicles;

E. Churches;

F. Public office buildings, art galleries, museums, libraries, police and fire stations;

G. Neighborhood scale mixed use business-residential uses subject to a conditional use permit, and subject to the provisions and conditions governing mixed use developments in the BR-N zone;

H. Specialized instruction schools;

I. Small animal hospitals or clinics, provided:

1. The incidental boarding of animals under treatment only is allowed;

2. The portion of the building in which the animals are treated or boarded is sound-proofed; and

3. There will be no burning or dead animals on the premises.

J. Communication facility, subject to sections 2 through 19

of this ordinance.

SECTION 43. Ordinance 5138, Section 4, and K.C.C. 21.27.040 is hereby amended to read as follows:

Permitted uses - Commercial and nonresidential. The following commercial and nonresidential uses are permitted in the BR-N zone, subject to the off-street parking and landscaping requirements and other general provisions and exceptions as set forth in this title beginning with Chapter 21.46, except where modified by this chapter:

A. Retail sales of food and commodities, which involve only incidental and limited fabrication and assembly, and excluding auto service stations, repair or sale of heavy equipment, boats, tires and motor vehicles, sale of alcohol for on-premises consumption except in a restaurant with a Class A or Class C license from the Washington State Liquor Board, sale of gasoline or other fuels, theaters, playhouses and other recreation or entertainment uses, and carwashes.

B. Business offices and any type of use rendering professional or personal services to individuals, such as real estate or insurance brokerages, consultants, medical or dental clinics and repair of jewelry, eyeglasses, clothing, household appliances and tools, and excluding vehicle or tool rentals, public parking lots, on-premises recreation or entertainment, pet sales and veterinary clinics.

C. Public utilities, subject to the provisions of Section 21.08.070.

D. Publicly owned off-street parking facilities less than two acres in size located on any island surrounded by saltwater.

E. Communication facility, subject to sections 2 through 19 of this ordinance.

SECTION 44. Resolution 25789, Section 1401, and K.C.C. 21.28.020 is hereby amended to read as follows:

Permitted uses. Any of the following types of uses which can meet the following standards are permitted and allowed by this classification subject to the limitations set forth in this section.

A. Any on-premises retail enterprise dispensing food or commodities which may involve only incidental and limited fabrication or assembly of commodities; provided that, the sale of automobiles, trailers, boats, heavy equipment and similar commodities are specifically excluded;

B. Business offices which may include limited fabrication, assembly and repair of electronic components and devices and any type of use rendering professional services or personal services to the individual;

C. Hospitals, except mental and alcoholic hospitals;

D. Hotels and motels, except apartment hotels;

E. Enterprises providing entertainment and recreation; provided, however, that the operation of an adult theater shall be prohibited within five hundred feet of an R or S zone and, provided further, that adult theaters shall not be operated concurrently within five hundred feet of, nor within the same structure as, the operation of any other theater;

F. Lodges, private clubs and fraternal societies;

G. Moorages for private pleasure craft;

H. Mortuaries;

I. Any public utility installation relating directly to the distribution of services including switching and transmission stations, but not including warehouses, service yards or the like unless otherwise permitted by this title;

J. Public off-street parking facilities, whether publicly or privately owned and operated, provided any area so used shall

not be used for a vehicle, trailer or boat sales area or for the accessory storage of such vehicles unless otherwise permitted by this title;

K. Automobile rental;

L. Churches;

M. Public office buildings, art galleries, museums, libraries, police and fire stations;

N. On-premise signs without limitation as to size and the number, off-premise directional signs, and billboards subject to the provisions of Chapter 21.53, Signs and Billboards;

O. Recreational vehicle parks as provided in Chapter 21.09;

P. Household moving truck rental or trailer rental as an accessory use to an automotive service station only, provided that:

1. Not more than four trucks and eight trailers shall be permitted on a station site;

2. Whenever such uses are proposed at an existing station which has a common boundary with R or S classified property, the landscaping provisions set forth in Chapter 21.51 must be adhered to at least for that boundary.

Q. Community scale mixed use business-residential developments subject to a conditional use permit, and subject to the provisions and conditions governing mixed use developments in the BR-C zone.

R. Specialized instruction schools;

S. Self-service storage facilities, provided that:

1. The use of the property shall be limted to dead storage. Activities such as the servicing or repair of motor vehicles, boats, trailers, lawnmowers or similar equipment is prohibited;

2. No storage of flammable liquids, highly combustible or explosive materials or hazardous chemicals is permitted;

3. No residential occupancy of the storage units is permitted;

4. No business activity may be conducted within the individual storage units;

5. A manager shall be on the site at all times that the lessees have access to the storage units.

T. Communication facility, subject to sections 2 through 19 of this ordinance.

SECTION 45. Resolution 25789, Section 1601 and K.C.C. 21.32.020 is hereby amended to read as follows:

Permitted uses. The following uses only are permitted and specifically provided and allowed by this chapter:

A. Any use first permitted in the C-G classification provided however a dwelling shall be permitted on the same lot or site on which an industrial use is located when the dwelling is used exclusively by a caretaker or superintendent of such enterprise and his family

B. On-premise signs, off-premise directional signs, and billboards subject to the provisions of Chapter 21.53, Signs and Billboards.

C. Automobile body and fender works when operated and maintained wholly within an entirely enclosed building

D. Automobile assembly plant, when contained within a wholly enclosed building

E. Automobile painting, provided all painting, sanding and baking shall be conducted wholly within an enclosed building

F. Automotive service stations

G. Bag cleaning and conditioning

H. Bakeries, wholesale

I. Banks

J. Battery manufacture and rebuilding

K. Bleaching and dyeing plants

L. Blueprinting and photostating

M. Boat building and repairing for boats not exceeding one hundred ten feet in length

N. Bottling plants

O. Broom and brush manufacture

P. Building materials storage yards

Q. Carpet and rug cleaning plants

R. Ceramic products, manufacture of wall and floor tile and related small tile products, but not including bricks, drain, building or conduit tile

S. Clothes cleaning or clothes dyeing plants

T. Contractor's storage yards

U. Cosmetics, manufacture of

V. Creameries and dairy products manufacture

W. Die casting

X. Distributing plants (jobbers)

Y. Dog pounds

Z. Electrical appliances, manufacture and assembly of

AA. Electric neon sign manufacturing

BB. Electro-plating, silver, chrome, copper

CC. Feed and fuel yards

DD. Freight terminals

EE. Food products manufacture, storage, processing and packaging of, but not including the manufacturing and processing of lard, pickles, sauerkraut, sausage or vinegar

FF. Garment manufacture

GG. Hospitals, emergency only

HH. Hotels and motels

II. Ice manufacturing plant

JJ. Laundries

KK. Machine shops with a punch press up to twenty tons capacity, when contained wholly within an enclosed building and

the building is not closer than tree hundred feet to a residential or suburban zone; no drop hammer or drop forge is permitted

LL. Manufacture, processing, treatment or assembly of articles from previously prepared materials such as bone, canvas, cellophane, cork, fibre, felt, fur, feathers, glass, leather, paper, metal, stone, wood, yarn, plastics and shell

MM. Metal, manufacture and fabrication of products from (except major structural steel forms, boiler making and similar activities involving excessive noise, or major trucking in terms o((r))f over-standard dimensions per unit or over-standard dimensions of load)

NN. Parcel service delivery terminals

OO. Parking lots, public provided any area so used shall be improved and maintained as required by Chapter 16.74 of this code

PP. Pharmaceuticals, manufacturing, processing, packaging and storage of, including drugs, perfumes, toiletries and soap (cold mix only)

QQ. Plumbing supply yards

RR. Prefabricated building, manufacture of (no concrete)

SS. Pipe line booster or pumping plant in connection with water, oil, petroleum, gas, gasoline or other petroleum products,

TT. Printing and printing ink manufacture

UU. Public utility service facilities, yards or electric transmission substations

VV. Restaurants, including cocktail lounges

WW. Rubber, fabrication of products made from finished rubber

XX. Self-service storage facilities

YY. Storage of impounded and damaged cars, but no wrecking yards

ZZ. Storage for transit and transportation equipment, except freight classification yards

(A). Textile manufacture, processing or treatment

(B) Tile, manufacture of wall and floor tile and related small tile products

(C) Tobacco products, manufacture of

(D) Truck repairing and rental

(E) Upholstering

(F) Vacuum metalization

(G) Warehousing

(H) Accessory buildings and uses customarily incident to any of the above uses, when located on the same site with the main building

(I) Other similar industrial enterprises or businesses as set forth in Section 21.46.050 of this title

(J) Planned unit development as provided in Chapter 21.56

(K) Unclassified uses as provided in Chapter 21.44

(L) Business and professional offices

(M) Enterprises selling alcoholic beverages for on-premises consumption

(N) Police and fire stations, including regional police pistol range training facilities provided:

1. The training must be conducted within an entirely enclosed building, and

2. Noise standards pursuant to K.C.C. 12.88.020 and K.C.C. 12.88.030 must be met.

(O) Interim use for agricultural crops, open field growing, pasturing and grazing on five acres or more, provided:

1. Buildings are not permitted,

2. Any pen or structure used to confine or feed livestock shall not be located closer than seventy-five feet and in the case of swine or goats no closer than one hundred fifty feet to any boundary property line nor closer than forty-five feet to any building containing a dwelling unit or accessory living quarters on the same premises,

3. Any pasturing or grazing shall be adequately fenced and shall maintain a distance of thirty-five feet from any boundary property line which is a common line with S-R or R zoned property when such property is developed,

4. The number of livestock shall not exceed that permitted in the S-R zone,

5. Any open-air storage of hay, straw, shavings or similar organic materials shall maintain a distance of not less than thirty-five feet from any boundary property line, and a distance of not less than forty-five feet from any building containing a dwelling unit or accessory living quarters on the same premises.

(P) Retail stores not to exceed three thousand square feet of gross floor area.

(Q) Specialized instruction schools.

(R) Churches and other houses of worship.

(S) Communication facility, subject to sections 2 through 19 of this ordinance.

SECTION 46. Ordinance 7675, Section 3, and K.C.C. 21.37.030 is hereby amended to read as follows:

Permitted resource related resource uses. In an F zone, the following resource related uses only are permitted:

A. Growing and harvesting agricultural crops as well as the structures necessary for these activities, subject to the lot coverage and other provisions of the Agricultural zone and provided that agricultural crops sensitive to usual and normal use of herbicides are adequately buffered by the owner or operator from herbicide application on nearby forest lands.

B. Raising of livestock and small animals (including bees), subject to the lot coverage and the other provisions of the Agricultural zone;

C. Wildlife and fish propagation and management including

any associated buildings, facilities or improvements;

D. Removal, harvesting or retailing of vegetation from forest lands such as fuelwood, cones, Christmas trees, salal, berries, ferns, greenery mistletoe, herbs, and mushrooms provided that retailing does not involve use of permanent structures or signs;

E. Dispersed recreation and outdoor recreation facilities such as primitive campsites, trails, trailheads and snow-parks, warming huts for climbers and cross-country skiers (excluding recreational vehicle parks and campsites with utility hookups);

F. Optical and radio telescopes and other astronomic observation facilities requiring isolation from artificial light sources and electromagnetic interference;

G. Seismic and other geological monitoring facilities requiring isolation from artificial vibration;

H. Municipal water collection, pumping, processing and transmission facilities provided they do not impound water by means of a dam.

I. Communication facility, subject to sections 2 through 19 of this ordinance.

SECTION 47. Resolution 25789, Section 1901 and K.C.C. 21.38.020 is hereby amended to read as follows:

Permitted uses. In an F-R zone, the following uses only are permitted and as hereinafter specifically provided and allowed by this chapter:

A. The growing and harvesting of forest products, the operation of sawmills, log storage yards, and activities and structures incidental to each;

B. Livestock grazing and agricultural buildings and structures incidental thereto, and beehives, as provided in Section 21.22.020;

C. Unclassified uses as provided in Chapter 21.44;

D. Game and fish management;

E. Dams, power plants, flowage areas, transmission lines and stations, together with necessary accessory building;

F. Harvesting of any wild crop such as marsh hay, ferns, moss and berries;

G. Single-family residence, trailer, private summer cottages and incidental service buildings; provided, that multiple-lot subdivisions of more than four lots shall require a planned unit development to assure environmental protection;

H. Riding academies;

I. Watersheds;

J. Planned unit developments;

K. Communication facility, subject to sections 2 through 19 of this ordinance.

SECTION 48. Resolution 25789, Section 2101 and K.C.C. 21.42.020 is hereby amended to read as follows:

Permitted uses. In a Q-M zone the following uses only are permitted and as herein specifically provided and allowed by this chapter:

A. Quarrying and mining of minerals or materials, including, but not limited to, sand and gravel, rock, clay and peat;

B. The exploitation, primary reduction, treatment and processing of minerals or materials together with the necessary buildings, structures, apparatus or appurtenances on said property where at least one of the major mineral or material constituents being exploited is from said property, including, but not limited to, concrete batching, asphalt mixing, brick, tile, terra cotta and concrete products manufacturing plants, and rock crushers and the use of accessory minerals and materials from other sources necessary to convert the minerals or materials to

marketable products;

C. The growing and harvesting of forest products, the operation of sawmills and chippers and activities and structures incidental to each;

D. Agricultural crops, open field growing, stock grazing and the harvesting of any wild crop such as marsh hay, ferns, moss, berries, etc.;

E. Public utility facilities;

F. Dwellings used and required by mining or quarrying operations for continuous supervision by a caretaker or superintendent and his immediate family; and dwellings on the same premises which are being used for agricultural purposes, which dwellings are occupied only by persons employed on the same premises and their immediate families.

G. Compost processing limited to the receiving and processing of lawn clippings, leaves, branches, limbs, stumps, scrap lumber, and salvaged wood which has not been chemically treated and other acceptible organic materials necessary for conversion into marketable recycling/composted products.

H. Communication facility, subject to sections 2 through 19 of this ordinance.

SECTION 49. Ordinance 1730, Section 1, and K.C.C. 21.44.020 is hereby amended to read as follows:

Unclassified use permits required. Unless otherwise provided in this title, the following uses may locate only after the issuance of an unclassified use permit processed as provided in Chapter 21.60:

A. Airports and landing fields and heliports;

B. Correctional institutions;

C. Dumps, public or private, and commercial incinerators;

D. Hydroelectric generating plants;

E. Jail farms or honor farms, publicly-owned and used for

rehabilitation of prisoners;

F. Quarrying and mining, including borrow pits to a depth of over three feet, the removal and processing of sand, gravel, rock, peat, black soil, other natural deposits and oil and gas exploratory drilling, together with necessary buildings, apparatus or appurtenances incident thereto, subject to the following exceptions and conditions:

1. Except for oil and gas exploratory drilling, no unclassified use permit is required for exploration of such materials in any zone,

2. No unclassified use permit is required for uses authorized by issuing temporary permits under the grading ordinance, Section 16.82.050B of this code,

3. All operations shall be subject to the limitations on permitted uses in the Q-M classification, Sections 21.42.020 through 21.42.030 and land rehabilitation provisions, Section 21.42.120,

4. In conjunction with quarrying and mining operations, allied uses such as, but not limited to, rock crushers, concrete-batching plants and asphalt-batching plants may be authorized by the council. When the natural deposit has been depleted or the excavation is completed as prescribed by the permit, all allied operations shall terminate and all equipment and structures shall be removed. No such allied uses shall be permitted unless at least one of the major mineral constituents being processed is from the area covered by the permit,

5. Time limits may be imposed, at which time such operations shall terminate,

6. A bond shall be filed prior to the issuance of a grading permit guaranteeing to the county compliance with the provisions of this title in an amount determined by the director of the building and land development division but in no case less

than one thousand dollar cash bond. The bond shall be continuously maintained until the requirements of the permit have been satisfied;

G. Booster stations or conversion plants with the necessary buildings, apparatus or appurtenances incident thereto of public utilities or utilities operated by mutual agencies. These uses are excluded from the R-S zones and are permitted in the M-L, M-P and M-H zones without an unclassified use permit. Distribution mains are permitted in any zone without an unclassified use permit;

H. Public utility power-generating plants;

I. Refuse disposal sites, provided sanitary fill method is used;

J. Sewage treatment plants;

K. Sanitary fills - reclamation for public purpose by public agency;

L. Transfer stations (refuse and garbage) when operated by a public agency.

M. Public agency training facilities, including but not limited to academies for police or fire fighters, national guard training facilities, and vocational schools.

N. Transit park and ride lot, when operated by a public transit authority and when located in any R, S or G zone, provided:

1. The site has direct vehicular access to a designated arterial improved to King County standards.

2. Additional landscaping, screening, noise mitigation, access controls, signing restrictions, or conditions may be required to adequately accommodate pedestrians and bicyclists and ensure the compatibility of the transit park and ride lot with surrounding development.

O. Transit operating base, when operated by a public

transit authority and when located in a zone other than M-H zone, provided:

1. The site is of a minimum area of five acres;

2. The site has functional vehicular access to at least a designated major or secondary arterial improved to King County standards;

3. A protective fence or berm shall be installed on all property lines when adjacent to a residential zone.

4. All structures and buildings shall have a setback of fifty feet from any property lines where the adjoining property is vacant residential land or is developed with residential uses and shall meet the setback requirements of the applicable zone in all other cases.

5. Landscaping shall be provided in the setback area. Landscaping shall consist of a mix of predominantly evergreen trees including living trees, shrubs and ground plantings. Evergreen trees shall be a minimum height of four feet at the time of planting. Plantings shall be chosen and spaced so as to grow together within three years sufficient to obscure sight through the barrier;

6. Noise attenuating berms, walls or other structures may be provided in the setback area. The noise standards in Title 12 shall be considered to be minimum standards and shall be applied in determining appropriate noise mitigation methods.

7. Additional design, landscaping, screening, noise mitigation, access controls, site restrictions or other conditions beyond those established by county code or regulation and consistent with the State Environmental Policy Act may be required in order to adequately ensure the compatibility of the base with surrounding development.

P. Communication facility, subject to sections 2 through 19 of this ordinance.

SECTION 50. Resolution 25789, Section 2202, and K.C.C. 21.44.030 is hereby amended to read as follows:

Uses requiring conditional use permit. The following uses may locate subject to the issuance of a conditional use permit processed as provided in Chapter 21.58.

A. Cemeteries, provided:

1. No building shall be located closer than one hundred feet from any boundary line,

2. A protective fence and a landscaped strip of evergreen trees and shrubs at least ten feet in width shall be installed on all common boundary lines with R and S zoned property;

B. Columbariums, crematories and mausoleums, provided these uses are specifically excluded from all R zones unless inside a cemetery;

C. Commercial establishments or enterprises involving large assemblages of people or automobiles as follows, provided these uses are specifically excluded from all R, S-E and F-R zones:

1. Amusement parks,

2. Boxing and wrestling arenas,

3. Ball parks,

4. Fairgrounds and rodeos,

5. Golf driving ranges,

6. Labor camps (transient),

7. Drive-in theater; provided that no adult theater shall be operated within five hundred feet of an R or S zone or at a drive-in theater as defined in King County code 21.04.310 whose screen may be viewed from a public right-of-way or an R or S zone,

8. Race tracks, drag strips, motorcycle hills and Go-Kart tracks,

9. Stadiums;

10. Auction facilities;

D. Educational institutions not otherwise permitted;

E. Fire stations, including spaces for municipal offices and utility district offices, when located in any R, S, G, or A zone, provided the following conditions are conformed to:

1. All buildings and structures shall maintain a distance of not less than twenty feet from any property line that is a common property line with R-zoned property,

2. Any building from which fire-fighting equipment emerges onto a street shall maintain a distance of thirty-five feet from such street,

3. Open storage shall be prohibited,

4. Overnight parking and maintenance of municipal or utility vehicles shall be within an enclosed structure which is compatible in size and design with the surrounding area;

F. Hospitals, mental and alcoholic, provided they are specifically excluded from all RS, RD, RM-2400, RM-1800 and S zones;

G. Institutions for training of religious orders;

H. Kennels, provided that the minimum site area is five acres and that the buildings housing such use and animal runs shall not be closer than one hundred fifty feet to any boundary property line of the premises and that they are specifically excluded from all R zones. The zoning adjustor may require such additional setback, fencing screening or soundproofing requirements as it deems necessary to ensure the compatibility of the kennel with surrounding development;

I. ((~~Radio, microwave or television transmitters, towers and appurtenances, provided;~~

~~1. New facilities or uses shall share common sites with existing facilities or uses whenever possible, unless the applicant demonstrates that it is not feasible or beneficial to combine the installation of new facilities or uses with existing~~

~~facilities or uses that are located in close proximity;~~

~~2. Sufficient setbacks or easements are provided to protect improvements on adjacent property in the event of tower collapse;~~

~~3. Public access to towers shall be precluded;~~

~~4. Vehicle access and utility corridors shall be shared whenever possible~~)) Communication facility, subject to sections 2 through 19 of this ordinance;

J. Recreational areas, commercial, including yacht clubs, beach clubs, tennis clubs, parks ski areas, marinas and similar activities;

K. Universities and colleges, including dormitories and fraternity and sorority houses when on campus;

L. Commercial establishments or enterprises involving open recreational uses of land as follows, provided these uses are specifically excluded from all R and S zones:

1. Campgrounds,

2. Camps, such as boy scout, girl scout, church, YWCA, YMCA, and similar types,

3. Recreational camps and resorts,

4. Outdoor stage theaters,

5. Recreational vehicle parks as provided in Chapter 21.09;

M. Hunting and fishing camps, gun clubs and rifle and pistol ranges, provided these uses are specifically excluded from all R and S zones, and provided further, the following conditions are conformed to:

1. All installations shall be located at such a distance from adjoining property lines as will protect abutting property from hazard, noise or dust; provided, that a minimum distance of fifty feet shall be maintained,

2. Firing ranges shall be designed so as to prevent stray

or ricocheting bullets or pellets from leaving the property,

3. Plans submitted with the application shall, at a minimum, show location of all buildings, parking areas and access points; safety features of the firing range; provisions for reducing noise produced on the firing line; elevations of the range showing target area, backdrops or butts; and location of buildings on adjoining properties.

N. Utility district offices. These uses are subject to the following exceptions and conditions:

1. Setbacks adequate to protect adjacent properties in the form of landscaped screening areas shall be required, provided that all buildings and structures shall maintain a distance of not less than twenty feet from any property line that is a common property line with an R or S zoned property,

2. Open storage shall be prohibited unless it can be demonstrated to the satisfaction of the zoning adjustor that screening or other visual designs can be affected which will be compatible with the surrounding area,

3. Overnight parking and maintenance of municipal or utility vehicles shall be within an enclosed structure,

4. All buildings and structures shall be compatible in size and design with surrounding area.

O. Commercial and/or multifamily residential use of buildings listed on the National Register as an historic site or designated as a King County lnadmark located in an R, S, G, or A zone, provided:

1. Gross floor area of the building additions or new buildings required for the conversion shall not exceed twenty percent of the gross floor area of the historic or landmark buildings,

2. Conversions to multifamily use in the RS, RD, S, G and A zones shall not exceed one dwelling unit for each three

thousand six hundred square feet of lot area,

3. Any construction required for conversion which affects significant features of the property protected pursuant to Ordinance 4828 and KCC 20.62 shall require certification of appropriateness from the King County Landmark Commission.

P. Cottage Industries, only in the following zones; G-5, G, A, S-E, S-C, GR-5, and GR-2.5, provided the following conditions are conformed to:

1. The site shall have a minimum area of thirty-five thousand square feet and meet the lot size requirements of the applicable zone;

2. The cottage industry shall be incidental to the use of the property for dwelling purposes and shall be less than fifty percent of the living area of the dwelling. This fifty percent square footage limitation includes outdoor assembly and storage areas but not required parking areas;

3. The following uses shall not be allowed:

a. Any activity which might result in excessive noise, smoke, dust, odors, heat or glare beyond that which is common to a residential area. The proposed use shall conform to the maximum permissible sound levels under K.C.C. Chapter 12.88. The zoning adjustor may require an applicant to provide sound level tests demonstrating such conformance.

b. Use or manufacture of products or operations which are dangerous in terms of risk of fire, explosion, or hazardous emissions.

c. Any other use deemed incompatible with a residential and/or agricultural area, subject to the review of the zoning adjustor;

4. Landscaping shall be required to screen parking areas and outside storage from the view of adjacent landowners and County roads;

5. Increased setbacks or additional screening may be established by the zoning adjustor to ensure that any proposed structure is compatible with the surrounding residential or agricultural area;

6. Required zoning setbacks may be increased subject to the review of the zoning adjustor for any activity which could potentially detract from a residential area but which is not deemed incompatible with the neighborhood. Such activities include but are not limited to: employee parking areas, loading zones, outdoor storage, and outdoor work areas;

7. Any display or sign shall be subject to the review of the zoning adjustor;

8. All sales shall be an incidental use;

9. The allowable size of equipment used by the cottage industry shall be subject to the review of the zoning adjustor.

Q. Bed and breakfast guesthouse, provided:

1. The bed and breakfast guesthouse operation shall be located only on the premises of the permanent residence of the operator(s).

2. The guesthouse operation shall be compatible with the residential character of the neighborhood.

3. Signs shall be limited to one single-faced or double-faced identification sign not to exceed six square feet in area in G, SE, GR, G-5, and A zones nor two square feet in area in any other zone. Signs shall not be allowed within required setbacks except when located in G, SE, GR, G-5, and A zones.

4. One off-street parking space shall be provided for each guestroom plus the required off-street parking spaces for the dwelling. This parking area shall not be located within any required yard. Landscaping may be required to screen parking areas from the view of adjacent properties and from public roads.

5. Serving meals to paying guests shall be limited to

breakfast.

6. The wastewater disposal facility and the domestic water supply serving the guesthouse shall be subject to the approval of the Seattle-King County health department.

7. The number of persons accommodated per night shall not exceed five except that a structure which satisfies the standards of the Uniform Building Code as adopted by King County for R-1 occupancies may accommodate up to ten persons per night.

8. A change of use permit must be obtained from the building and land development division.

R. Specialized instruction schools, provided they are excluded from the A, A10 and A35, F, and FR zones where appropriate non-resource uses are set forth. Since the conditional use process is used to ensure the compatiblity of this use with the surrounding neighborhood, specialized instruction schools are subject to the following provisions which the zoning adjustor may waive or modify when circumstances warrant:

1. Any building or structure on the site used for a school or its accessory use shall maintain a distance of not less than twenty-five feet from any property line.

2. Non-residential parking excluding driveways shall be limited to a maximum of 2.5 percent of the site.

3. Parking, beyond that required for residential uses on the site, shall be provided as follows:

a. One space for each instructor and employee,

b. One space for every two students and/or spectators in attendance during an instructional session.

4. Landscaping shall be consistent with requirements of K.C.C. 21.51.030E, except that when the parcel is greater than 35,000 square feet the requirements shall apply to that portion of the lot in which the school and any accessory uses are located

rather than the perimeter of the site.

5. Signs shall be limited to one unlighted double-faced sign not exceeding six square feet of area per face pertaining only to the instructional and sales activities of the property upon which displayed.

6. Retail sales shall be allowed as an accessory use to a specialized instruction school provided:

a. The site has a minimum lot size of 2.5 acres.

b. Sales shall be limited to items related to the instructional courses.

c. Total floor area for the retail sales shall be limited to two thousand square feet.

d. Additional parking for retail uses shall be provided as required in 21.50.040A.

7. Sale of prepared food shall be allowed as an accessory use to a specialized instruction school provided:

a. The site has a minimum lot size of 2.5 acres.

b. This use is contained in the same structure as the school.

c. Floor area for this use shall be limited to one thousand square feet.

d. Additional parking shall be provided as required in 21.50.040A for commercial uses.

S. Wineries provided they are excluded from all R and S zones and the A, A-10, A-35, F, and QM zones, and further provided that:

1. All developed uses are located on a parcel or parcels of sufficient size to screen and buffer the on-site activities to be compatible with adjoining properties, and

2. The site shall have access sufficient so the traffic will not unduly impact surrounding residences.

3. Any public concert which is subject to the provisions

of K.C.C. 6.52, must obtain the necessary permits as provided in that chapter.

SECTION 51. The effective date of section 15 shall be December 31, 1991.

SECTION 52. Ordinance 6765, Sections 1-4 as amended and K.C.C. 20.12.327; Ordinance 7212 as amended, and K.C.C. 20.12.328 are repealed.

SECTION 53. Severability.

Should any section, subsection, paragraph, sentence, clause or phrase of this ordinance be declared unconstitutional or invalid for any reason, such decision shall not affect the validity of the remaining portion(s) of this ordinance.

INTRODUCED AND READ for the first time this 25th day of June, 1990.

PASSED this 8th day of July, 1991.

KING COUNTY COUNCIL
King County, Washington

Lois North
Chairman

ATTEST:

Gerald A. Peterson
Clerk of the Council

APPROVED this 18th day of July, 1991.

King County Executive

APPENDIX A

REVIEW PROCESS BY ZONE

ZONE CLASSIFICATION	TYPE OF COMMUNICATION FACILITY		
	Earth Station Facility	Minor Communication Facility	Major Communication Facility
RS - Single Family Dwelling	C[1] or U	C	C[3] or U
RD 3600 - Low Density Multiple	C[1] or U	C	C[3] or U
RM - Multiple Family Dwelling	C[1] or U	C	C[3] or U
RT - Residential Townhouse	C[1] or U	C	C[3] or U
SE - Suburban Estate	C[1] or U	C	C[3] or U
SC - Suburban Cluster	C[1] or U	C	C[3] or U
SR - Suburban Residential	C[1] or U	C	C[3] or U
GR - Growth Reserve	C[1] or U	C	C[3] or U
G - General	C[1] or U	C	C[3] or U
G-5 - General, Five Acres	C[1] or U	C	C[3] or U
A-R - Rural Area	C[1] or U	C	C[3] or U
A - Agriculture	P[2] or C	C	C[3] or U
A-10 or 35 - Agricultural	P[2] or C	C	C[3] or U
B-N - Neighborhood Business	P[2] or C	C	C[3] or U
BR-N - Business/Residential Mixed Use, Neighborhood	P[2] or C	C	C[3] or U
B-C - Community Business	P	P	P
BR-C - Business/Residential Mixed Use, Community	P	P	P
C-G - General Commercial	P	P	P
M-L - Light Manufacturing M-P - Manufacturing Park M-H - Heavy Manufacturing	P	P	P
F - Forest	P	P	P
F-R - Forest-Recreation	P	P	P
Q-M - Quarry and Mining	P	P	C
AOU - Airport Open Use	C	C	C

K E Y
P-Permitted Use U-Unclassified Use C-Conditional Use

1. Limited to 3 or less satellite dish antennae.
2. Limited to one satellite dish antennae.
3. Limited to tower consolidations.

APPENDIX A-1

Minor communication facilities for the transmission or reception of cellular radio signals shall be permitted based on the type of transmission structure used at the facility and the zone in which the facility is located, as follows:

Type of Transmission Structure	Zone	Review Process	Setbacks[3/]
Poles no more than 100 feet tall[1/]	RS, RD, RM, RT	AC[2/]	Zone [4/] plus 15 feet
	SE, SC, SR, A-R	AC	Zone w/ 10 foot minimum
	All other zones	P	Zone w/ 10 foot minimum
Poles over 100 feet tall	RS, RD, RM, RT	C[2/]	One-half for one[5/]
	SE, SC, SR, A-R	AC	Zone plus 20 feet
	All other zones	AC	Zone plus 10 feet
Lattice towers	RS, RD, RM, RT	U[2/]	One for One[5/]
	SE, SC, SR, A-R	C	One-half for one
	All other zones	C	Zone plus 20 feet

KEY	
P	Permitted Use
U	Unclassified Use
C	Conditional Use
AC	Administrative Conditional Use

FOOTNOTES:

1/ The Division may decide whether a pole no more than 100 feet tall will be wood or steel, based on a determination of which material would be more appropriate at the proposed location.

2/ The following special procedures and conditions shall apply to the review and issuance of permits for facilities in RS, RD, RM, and RT zones:

(a) The applicant shall demonstrate that the proposed facility complies with all applicable laws and that it should be located in an RS, RD, RM, or RT zone to meet the needs of the cellular telephone system.

(b) The applicant shall arrange a public meeting with owners of property near the proposed facility for the purpose of providing information and receiving comments about the proposed facility. The public notice issued regarding the filing of the administrative conditional use permit, or the public hearing on the conditional or unclassified permit, shall announce the time, date, location, and purpose of the public meeting. A Division representative shall attend the meeting.

3/ The setback requirements listed in this Appendix A-1 apply to the transmission pole or tower and transmission equipment placed on the pole or tower. The county decision-maker may reduce the setback where the applicant demonstrates that the facility will be adequately screened from public view.

4/ "Zone" means the transmission structure shall be set back from property lines as required by the zone in which the facility is located for structures which do not exceed the zone's height limit. The transmission structure may exceed the height limit of the zone if it meets the setbacks specified in this Appendix A-1.

5/ "One-half for one" and "one for one" mean the transmission structure shall be set back from property lines one-half foot or one foot, respectively, for every foot of pole or tower height.

07/08/91:TMW-390

APPENDIX B

10021

NIER Exposure Standards* (1)

Frequency (2)	Mean squared electric field strength (3)	Mean squared magnetic field strength (4)	Equivalent plane-wave power density (5)
0.1 to 3	80,000	0.5	20,000
3 to 30	4,000 x ($180/f^2$)	0.025 x ($180/f^2$)	$180,000/f^2$
30 to 300	800	0.005	200
300 to 1500	4,000 x (f/1500)	0.025 x (f/1500)	f/1.5
1500 to 300,000	4,000	0.025	1000

(1) All standards refer to root mean squared measurements averaged over a six minute period.

(2) Frequency or f is measured in megahertz (MHz)

(3) Electric field strength is expressed in volts squared per meter squared (V^2/m^2).

(4) Magnetic field strength is expressed in amperes squared per meter squared (A^2/m^2).

(5) Power density is expressed in microwatts per centimeter squared (uW/cm^2).

* Peak NIER levels shall not exceed the following equivalent plane-wave power densities:

- Twenty times the average values in the frequencies below 300 MHz;
- 4,000 uW/cm^2 in the frequencies between 300 Mhz and six gigahertz (GHz);
- (f/1,500)uW/cm^2 in the frequencies between six GHz and 30 GHz; and
- 20,000 uW/cm^2 in the frequencies above 30 GHz.

Appendix B 5/31/91

Ord. No. 10021

ATTACHMENT 1

ISSUE PAPER
COMMUNICATIONS FACILITIES ORDINANCE

I. PURPOSE

To provide information on the development of the ordinance before Council and to outline the key issues.

II. HISTORICAL BACKGROUND

A. Demand for New Facilities:

There are growing demands for new facilities by the communications industry. This increased demand is a result of Federal Communications Commission (FCC) deregulation of the industry and changes in coverage requirements for existing licensees.

Deregulation has increased the number and variety of communication companies with specific technology and needs to serve their customers. Cellular phones are one example of services now offered where technology and demand did not exist until very recently.

New FCC regulations have pressured licensees to consider increased tower heights to maintain their current license status. Maintaining current license status directly relates to the ability to serve their area of coverage at levels dictated by the FCC and to compete for funds.

In this area, applications are pending for increased tower heights by television and FM radio facilities within Seattle. This has no direct bearing upon unincorporated King County, but illustrates the pressure to meet new FCC requirements. King County can expect similar pressure from existing FM radio facilities on Cougar and/or Tiger Mountains for increased tower height in order to comply with new FCC coverage regulations; new county or federal NIER standards; or to maintain a competitive marketing position.

B. Siting Conflicts:

Controversy over the siting of communication facilities is most evident on Vashon/Maury Islands and near the summit of Cougar Mountain, west of Issaquah. The facilities at issue are significantly different, however the prevailing concerns are similar.

In both instances, health and land use impacts were cited. On Vashon and Maury Islands, a number of earth stations are located on large sites containing existing AM radio towers. The exception is the Alascom site located in the Paradise Valley area of Vashon Island. The siting of this facility galvanized opposition towards all types of communication facilities on Vashon and Maury Islands.

The situation atop Cougar Mountain differs in the type of facilities involved. Whereas the most controversial facilities on Vashon and Maury Islands are primarily earth stations operating at higher frequencies and lower power levels; the facilities atop Cougar Mountain are primarily FM radio stations operating at lower frequencies and higher power levels.

III. COUNTY ACTIONS

Recognizing concerns regarding health and land use impacts, the County took action in effort to balance the interests and needs of the communications industry with those of its residents.

A. Council Establishment of Moratoriums:

In April, 1984 the Council adopted Ordinance 6765 establishing a temporary moratorium on the construction of communication facilites on Vashon and Maury Islands due to public health concerns voiced by island residents.

In May, 1985 the Council adopted Ordinance 7212 establishing a similar moratorium for the "antenna farm" near the summit of Cougar Mountain. The moratoria were to be effective until the establishment of new siting criteria by BALD.

Since the adoption of the original moratoria, both ordinances have been extended. The latest extension is to June 30, 1990. The moratoria contain a repeal clause effective with the adoption of this ordinance.

B. Ordinance Development:

Concurrent with the adoption of the Vashon/Maury Island moratorium, the Council directed BALD to develop an ordinance setting forth new criteria for the siting of communication facilities.

Responding to this directive, BALD formed a task force consisting of county staff representing various agencies. This group provided the first scoping of the issues to be reviewed by the Council.

Concern for adequate representation voiced by both community and industry groups, resulted in the formation of a new expanded task force. This task force consisted of ten members including four community representatives (one which was appointed chairperson); two industry representatives and four county staff from various agencies.

A consultant team composed of experts and specialists from various disciplines such as land use law, electrical engineering, economics and bioengineering was hired to assist in the review of the complex technical issues confronting the task force.

The consultant team was responsible for the collection and review of studies and other pertinent datum. This information was presented to the task force and any person requesting it. Based upon this information and task force comments, the consultant team produced the Regulatory Policies Report dated December, 1986 in which various alternatives are offered.

In January, 1987, the consultant team was called upon to produce the two initial versions of the ordinance. BALD staff authored the third and fourth drafts. All drafts were subject to review by the task force and the general public.

A SEPA threshold determination was issued on draft four in preparation for transmittal of the ordinance to Council. The threshold determination was appealed and hearings on the appeal were conducted through January 1988. A decision by the Examiner upholding the threshold determination was issued in November 1988.

Subsequent to the Examiner's decision, the Department of Public Health was requested to reevaluate the data and the proposed NIER exposure standard and to further study the most recent literature on the subject. The Health Department has completed their reevaluation and recommends the proposed NIER standard.

IV. ISSUES

The issues revolve around the two general concerns of health and land use.

A. Health Related Issues:

NIER effects are described in terms of the rate (specific absorption rate or SAR) which a body absorbs energy within an electromagnetic field. This is the average rate of absorption per unit mass of tissue expressed in terms of watts/kilogram (W/kg). Adopted and recommended NIER standards have been based upon a percentage of SAR levels that are generally thought to result in adverse biological effects.

This ordinance limits exposure of the general public to NIER although there remain many unresolved questions concerning the potential health impacts. There is on-going debate as to under what conditions and levels of NIER a health hazard exists. The transfer of energy from the electromagnetic field of an RF source to a biological system, and the ultimate result of transferred energy in terms of biological change in living tissue, is extremely complex.

The entire issue of NIER exposure is considered a "moving target" because of the reluctance of the federal government to adopt a standard or provide clear guidance. This has left the task of adopting individual standards to state and local governments.

The FCC has not addressed the issue except to state that: "..The possibility of one of our licensees jeopardizing the public health or safety is a matter of serious concern. However, since we have no expertise in the area of public health, we defer to the judgment of professionals..."

1. Environmental Protection Agency (EPA) Options.

The EPA had been anticipated to promulgate a health standard for all federal agencies which would preempt all local regulation.

In 1986, the EPA issued draft guidelines for radiation protection and identified four possible options (three regulatory and one non-regulatory). Their statement of intent appeared in Volume 51, Number 146 of the Federal Register, dated July 30, 1986.

The options partially encompassed the range of limits adopted by state or local jurisdictions in the U.S. or recommended by various advisory groups such as the International Radiation Protection Association (IRPA), the National Council on Radiation Protection and Measurements (NCRPM), and the American National Standards Institute (ANSI).

Option 1 entailed a SAR of .04 W/kg or a power density of 100 uW/cm^2. According to the EPA, this represented a "no effects" level by protecting even the most sensitive population subgroups against thermal effects. No measurable changes in core temperature would occur at this level nor would the thermoregulatory responses be initiated. This option is 10 times lower than the 1982 ANSI guideline of 1,000 uW/cm^2. According to the EPA this level may be "unnecessarily stringent" in that the safety factor provided may not be commensurate with its cost.

Option 2 entailed a SAR of .08 W/kg or a power density of 200 uW/cm^2. The EPA stated that this option also effectively represents a "no effects" level. This option differs from option 1 in that it is lower than the 1982 ANSI guide by a factor of 5 rather than 10. This option is similar to standards adopted by the state of Massachusetts; Multnomah County, Oregon and City of Portland, Oregon. This option is also similar to guidelines recommended by IRPA and the NCRP.

Option 3 entailed a SAR of 0.4 W/kg or a power density of 1,000 uW/cm^2. The EPA stated that this option should protect against thermal effects except in, possibly, more sensitive populations or at higher ambient temperatures and humidities. This level corresponds to

the lower end of the range imputed to be associated with the onset of thermoregulatory response. This option is currently used by the FCC to determine a need for environmental impact statements.

Option 4 involved little more than establishing public awareness programs to distribute information on health effects as well as provide technical assistance to local, state and federal agencies.

However, the EPA has abandoned efforts on this issue citing both budgetary constraints and a priority towards solving known and quantifiable problems.

2. EPA and City of Seattle Literature Review.

In 1984, the EPA published a report summarizing literature on the biological effects of NIER which was available through 1982. Under an interagency agreement with the City of Seattle, the EPA summarized the more recent literature, excepting that dealing with carcinogenesis. The findings of the 1984 report were modified on the basis of post-1982 research studies.

The EPA/Seattle review of literature on non-cancerous effects (completed in May 1987) provides evidence that biological effects occur at a SAR of about 1 W/kg (equivalent to a power density of 2,500 uW/cm^2). Some of these effects may be significant under certain environmental conditions.

However, the biological significance of SARs below 1 W/kg was not conclusively established. The primary significance of the EPA/Seattle update is that, although the conclusions of the 1984 review have not changed, the earlier findings are confirmed for significant biological effects at 1 W/kg. The effects upon which this conclusion was based are generally thermal effects.

Seattle conducted a separate review of twenty selected research efforts pertaining to cancer. The publications were a subset of literature on biological effects of exposure to various frequencies of electromagnetic fields focused on effects involving malignancies.

Twelve of the publications were epidemiological studies. The primary question of NIER fields as carcinogens or promoters of malignant disease was often answered by the citing of statistically reliable correlations. Yet with each correlation exists the possibility that toxic chemicals, heavy metals, ionizing radiations, excessive noise or other stresses were the cause of biological insult. Not to be ruled out is the possibility of "complexing" (i.e., RF fields which benign in isolation, might exacerbate the ill effects of toxic agents).

It should be noted that unlike toxic agents, the effects of NIER are not cumulative (i.e. build up over a period of time). The ability for the build-up of toxicity is a primary reason for the extremely high safety factors applied to toxic agent exposure standards.

As a whole, the epidemiological studies were inconclusive in their outcomes, but the frequent hints of association between NIER exposure and malignancies, reinforce the need to confirm earlier studies. Unfortunately epidemiological studies, by their nature, cannot confirm cause-effect relationships. Their value lies in generating plausible hypotheses that must be substantiated in the laboratory if cause-effect relationships are to be established reliably.

The absence of confirming evidence is not evidence of the absence of hazard. A number of studies indicate the possible presence of carcinogenic thresholds, yet these studies have not been confirmed by independent analysis. Integrity of the scientific datum is established when it is reproduced by laboratories of independent investigators.

3. Thermal and Non-thermal Effects.

NIER induces increased molecular motion in objects, such as human tissue, with high water content. The effect of this motion is exhibited as a thermal (temperature) increase. High levels of NIER in excess of 10,000 uW/cm^2 can cause warming to hazardous levels.

Smaller quantities of NIER also heat the body. However, much of that energy is accomodated by the body's thermoregulatory system without adversely affecting the body over time. Generally, before this energy causes adverse effects, the heat is dissipated by perspiration or the adjustments of blood flow and blood vessel size. However, sensitive populations (e.g. the elderly, pregnant women or the chronically ill) generally cannot physiologically react in the same manner.

Non-thermal effects can also be caused by NIER. Some of these effects have included changes in calcium ion efflux in isolated slices of chicken brains, atypical hormonal secretions and behavioral changes. The long-term consequences of non-thermal effects are not yet clear.

4. Use of Power Density versus Specific Absorption Rates (SAR).

Direct measurement in live human beings of the energy absorption from an electromagnetic field is not possible. Therefore measurements of some characteristic of the electromagnetic field are necessary to impute a SAR. For this reason, NIER standards are expressed in terms that are consistent and measurable; for example, electric or magnetic fields, or "power density".

Power density is the amount of electromagnetic energy density at points in space measured in power per unit area (watts per square meter) and generally noted as microwatts (uW) per square centimeter in NIER standards. A microwatt is one-millionth of a watt.

5. Frequency Dependent Standards.

The frequency at which the electromagnetic energy is emitted is one factor that determines the potential effects of NIER on the human body. At any given power density, the human body absorbs maximum amounts of energy at frequencies in the 30 to 300 megahertz (MHz) range. At these frequencies the wavelength most closely corresponds to the height of the human body. This range of frequencies is called the "resonant frequencies".

The relationship of SAR to power density in the resonant frequency range is shown below:

SAR (W/Kg)	Power Density (uW/cm^2)
4.0	10,000
1.0	2,500
.4	1,000
.1	250
.08	200
.04	100
.02	50

6. Localized Heating.

Exposed to energy within a uniform electromagnetic field, a body may have localized heating in certain areas, such as ankles and wrists, which would exceed the average whole-body absorption rate. Energy absorption by a given body part depends on the features of the fields created by an energy source; proximity of other objects; and the size, shape and dielectric properties of a body receiving the energy.

This localized energy absorption is unpredictable due to factors noted above nor can it be measured in a living subject. This is the reason that the scientific community (and the proposed ordinance) recommends using whole-body averaged exposure rather than partial-body exposure (specific body parts) in setting standards.

7. Applicability of NIER Standards.

The ordinance does not apply to extremely low frequency (ELF) radiation encountered in 60 Hertz electromagnetic fields generated by electric power lines. Neither does it set occupational exposure standards which are in the purview of federal and state occupational and health safety organizations.

8. Measurement Technique.

The ordinance recommends a "spacial average" technique. The technique involves "waving" of a measurement device over an area similar in size to a persons torso and an average reading would be recorded as well as the highest and lowest. This averaging would tend to give less significance to the presence of small, isolated "hot spots"; but it best approximates the overall strength of the electromagnetic field in which a body is immersed and the dose received by the whole human body. Whole-body rates have been the basis for the setting of NIER standards by other local goverments as well as groups such as the NCRPM, ANSI and the IRPA.

While no other jurisdiction has explicitly required a particular measurement procedure; spacial averaged measurement is, in practice, the way ambient radiation is usually measured by the FCC and EPA.

It has been suggested that the highest or peak readings encountered in hot spots should be the basis for compliance with an NIER standard. The department believes that spacially averaged readings provide a more reliable and useful description of the electromagnetic field to which a person is exposed. Hot spots are somewhat transitory, often a result of perturbed fields and may change both in location and intensity with changes to environmental conditions such as temperature and humidity. Due to their variability, peak readings would not provide for consistent measurements.

This does not imply that peak radiation values of these hot spots are not significant. The proposed NIER standards include exposure limits to peak radiation which may be measured during spacial measurements.

9. NIER Measurements.

The ordinance proposes measurements to occur in conjunction with earth stations and major communication facilities. Minor communication facilities do not generate the high power densities which justify monitoring of NIER.

10. Proposed NIER Standard.

The ordinance proposes a power density of 200 uW/cm^2 in the resonant frequency range. This is a moderately conservative stance in light of uncertain health implications. Some consensus was achieved on the task force that this level represents a reasonable measure of protection.

There is still uncertainty and debate within the scientific community regarding the threshold of biological effects and therefore as to what the appropriate standard should be. This lack of consensus among the "experts" only serves to confuse the issue for those actually responsible for adopting a standard.

There is scientific consensus that power densities of 10,000 uW/cm^2 in the resonant frequencies cause harmful biological effects due to heating (i.e. thermal effects). This is where the consensus ends. Biological effects occur at around the 2,500 uW/cm^2 level according to the EPA, but there is no scientific concensus that there are harmful effects.

Typically, a safety factor of ten has been used to arrive at a standard involving non-toxic agents. For instance, the 1982 ANSI guide assumed a threshold of biological effects at 10,000 uW/cm^2 in establishing the 1,000 uW/cm^2 advisory standard for both occupational and general population exposures. Some organizations such as the NCRPM and IRPA and various local governments have cut this 1,000 uW standard by a factor of five to establish advisory standards of 200 uW/cm^2.

In June 1989, the Standards Coordinating Committee 28 of ANSI approved new standards for "controlled and uncontrolled environments" (i.e. occupational and general population exposures). The new "two-tiered" standard retains 1,000 uW/cm^2 for occupational exposures and establishes 200 uW/cm^2 for the general population exposures similar to that approved earlier by the NCRP and IRPA.

Local jurisdictions, the scientific community and national and/or international standard setting organizations are converging on this 200 uW level as the appropriate standard as shown by the recent actions of groups such as ANSI, NCRP and IRPA. There seems to be more "comfort" in the scientific community and the health standard setting organizations at this level, although there is little scientific rational for the 200 uW over the 100 uW level (or vice versa).

Maximum exposure limits are proposed for peak readings values. The limits are generally twenty times the spacially averaged value.

B. Land Use Related Issues:

The following are the key land use issues.

1. Regulatory Requirements by Zone.

The ordinance provides for changes in development processes in a wide variety of zones.

Current regulations generally provide for all facilities built by public utilities to be outright permitted uses in most zones and all other facilities built by "non-utilities" are subject to to the conditional use permit process. Current regulations do not prohibit high power TV, AM and FM radio, and satellite from being established in the higher density residential zones.

The ordinance proposes changes to regulatory processes as shown on Appendix A.

2. Setback Requirements.

The standards represent greater setbacks than currently required. However, these standards apply to new facilities (not resulting from consolidation) in residential zones. In non-residential zones, the setback requirements of the underlying zone generally apply. Consolidation of existing facilities will be reviewed and conditioned regarding setbacks on an individual case-by-case basis.

3. Consolidation.

This issue is pertains primarily to the facilities atop Cougar Mountain and to a more limited extent atop Tiger Mountain.

On Cougar Mountain, there are a number of high powered FM radio facilities generally located on individual towers. The department has been approached regarding consolidation of existing towers onto one larger tower. This concept should receive serious consideration for two reasons. First, it may reduce the overall visual impacts. Secondly, it may significantly reduce the amount of NIER reaching ground level.

On Tiger Mountain, there is a facility which intially contained only one FM radio station. The tower now contains five FM stations as well as a TV station with little visual change. This points to one advantage of consolidated facilities.

4. Interference.

The ordinance takes a conservative stance on this issue. The county is preempted by federal law from actual regulation of interference since the FCC has that responsibility and authority.

The ordinance requires applicants to notify people in the area likely to be affected by interference from any new or modified facility. The notice would inform people of the extent of the applicant's responsiblities under FCC rules and the rights the general population under those rules. The ordinance does dictate specific actions in resolving interference disputes.

5. Landscaping.

The proposed standards are patterned after the existing landscaping regulations found under KCC 21.51. The placement of the buffers is flexible to allow for most effective coverage.

Ideally, natural vegetation will be retained in lieu of new landscaping. In most environments, natural vegetative buffers provide a less conspicuous screen than an equally dense landscaped buffer.

No amount of natural vegetation or landscaping will totally obscure view of a tower from all surrounding properties. The topographic differences and varied nature of vegetative cover in the county make complete mitigation unlikely.

6. Concentration versus dispersal

Advocates of the concentration of facilities state that concentration within "appropriate" areas would reduce impacts for the majority and increase impacts for a few. Advocates of dispersal, seek to spread the impacts equally among all who benefit from these facilities.

The ordinance advocates the concentration of facilities. This is due the topographic characteristics of King County and the entire Puget Sound region.

The county has no site which would be equally appropriate for placement of all types of communication facilities. Each facility has a unique technological characteristic.

The locational and technical considerations generally limit the placement of TV and FM radio stations to such areas as Queen Anne and Capitol Hills in Seattle and Cougar or Tiger Mountains in the county. These areas are desirable because they provide optimum line-of-sight transmission and close proximity to the targeted markets.

AM radio and earth stations generally do not require placement in higher elevations and can function well in low-lying areas of the county.

No site can meet all the criteria for construction of the various types of facilities provided by the communications industry. For these reasons, dispersal is not a viable alternative, no matter how philosophically attractive.

V. FUTURE ACTION

Current data are fragmentary and unconfirmed, however there are indications that the threshold of effects from NIER may be lower than anticipated in the early 1980's. Much of the research conducted in this field has concentrated on thermal effects. The biological implications of non-thermal effects have not received the same level of scrutiny.

National standard-setting organizations are converging on the 200 uW level for an advisory public exposure standard. A number of local jurisdictions have adopted 200 uW as their regulatory standard. However, there is no federal regulatory standard and the issue continues to be debated at the local levels.

The 200 uW level should be viewed as an appropriate standard in light of current data. Historically, health standards have become more restrictive over the years in response to new, substantiated data. As more information becomes available regarding the biological implications of thermal, and possibly more important non-thermal effects, the 200 uW standard should be modified. The department supports further review and definition of this issue, and urges the creation of a uniform national standard by the federal government.

In addition, the department urges all operators to consider the uncertainty of the data and the likelihood that the standards will be changed in years ahead. The lowest power density achievable at fenceline should be the goal of each operator.

ATTACHMENT 2

ORDINANCE SUMMARY

This ordinance contains new sections creating standards and defintions relative to communication facilities. These new sections will be later codified into one new chapter in Title 21.

The primary new features of this chapter include establishment of standards related to non-ionizing electromagnetic radiation (NIER) exposure limits; electric shock or burn risks; electromagnetic interference; measurement and calculation methods; and consolidation of facilities, structures and/or equipment.

>> NIER Exposure Limits

This ordinance proposes an exposure limit of 200 microwatts (uW^2) in the frequencies which are of the wavelength most easily absorbed by the human body.

The standard is consistent with the "advisory" standards adopted by the National Council on Radiation Protection and Management (NCRPM) and the International Radiation Protection Association (IRPA). This standard has been adopted as a regulatory standard by a number of jurisdictions throughout the nation. The City of Portland and Multnomah County in Oregon recently adopted this standard.

>> Shock or Burn Risks

This ordinance proposes a standard limiting to 50 milliamps the level of shock or burn to which the public can be exposed and to reduce the overall risk to exposure.

>> Electromagnetic Interference

This ordinance proposes a standard which requires notifying area residents regarding possible sources of electromagnetic interference and providing information on steps to reduce or eliminate it.

>> Measurement and Calculation Methods

This ordinance outlines methods for the measurement of NIER using the technique called "spacial averaging". Calculation methods are to be consistent with the FCC's OST Bulletin NO. 65.

>> Consolidation

This ordinance encourages consolidation (sharing) of sites, structures and equipment as a way of reducing the overall number of sites required to provide for the communication needs of the public. Incentives are provided for existing facilities to consolidate by allowing modified setback standards for such proposals.

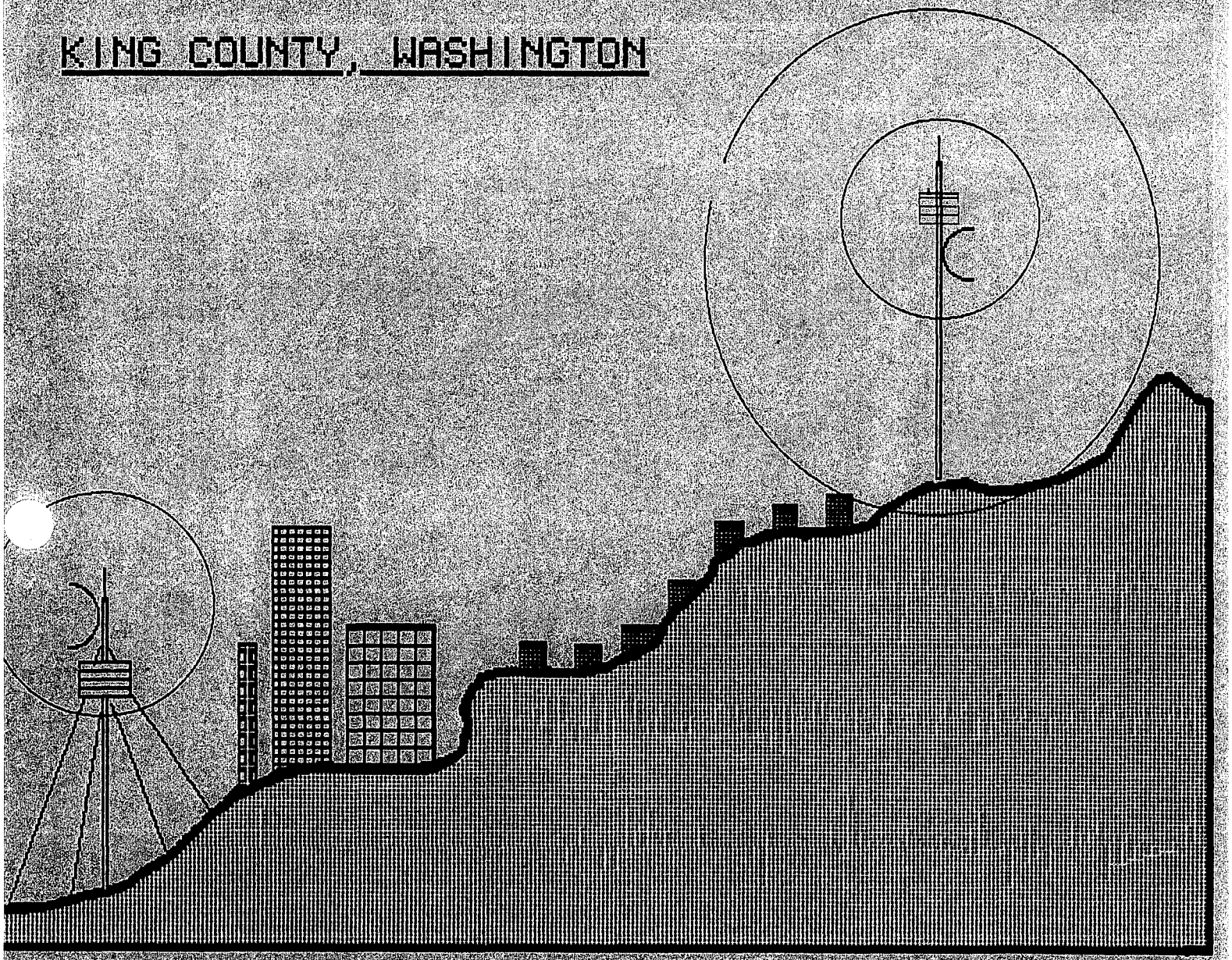
The ordinance concludes with amendatory sections which amend existing sections within Title 21. Not all zones have been amended due to the cross-referencing of uses within the various zones. Where amendments to the zones are necessary, the ordinance uses specific crosss-references to the new chapter to establish applicable standards and review processes.

ATTACHMENT 3
COMMUNICATION ORDINANCE
LISTING OF SECTIONS

REGULATORY POLICIES REPORT

TELECOMMUNICATIONS FACILITY PROJECT

KING COUNTY, WASHINGTON



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PREFACE AND ACKNOWLEDGEMENTS

This report was prepared by a team of consultants under King County contract no. P01044P.

Many people helped provide information, reviews, ideas, and analyses for this report. In particular the authors express our gratitude to the members of the King County RF Task Force, other citizen and industry representatives at Task Force meetings, and staff of the King County Departments of Planning and Community Development and Health for their time, labor, and thought.

The opinions, findings, and conclusions presented in this report are those of its authors, and do not necessarily represent the views of King County officials or staff, members of the County RF Task Force, or other participants in the project.

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

PART I

ORGANIZATION AND PURPOSE OF REGULATORY POLICIES REPORT

Organization. This report is divided into 4 major parts.

The first part is an introduction. It explains why King County decided to study transmission facility siting, and how this report is to be used.[1]

In summary the project was needed, because the County Comprehensive Plan and Zoning Ordinance do not contain suitable information, standards, and procedures sufficient to deal with RF facilities. This made it hard to decide how, where, and whether County officials should approve such facilities. Conflicts lead to delay, litigation, and moratoria in some areas.

To end the conflict and resolve uncertainties, County officials employed a team of qualified people to study and explain the effects of RF facilities and ways to deal with them. This report is the culmination of their work.

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1. The terms "transmission facility", "telecommunication facility", "RF facility", and "facility" are used interchangeably throughout this report. Unless the context warrants otherwise, such a facility includes a given structure that supports RF transmitting and/or receiving devices, the devices themselves, accessory uses such as parking, landscaping, and buildings, and the land on which they all are sited.

The second part summarizes the reports that the consulting team has prepared for the project. Those reports contain hundreds of pages of text, appendices, and reprints of related studies. The summary in this report explains key concepts from those reports. After a given concept is explained, the text lists the pages of the reports on which the explanation is based. The reader can find more information about each concept in the prior reports.

The third part of this report describes the factors to consider in drafting new standards and procedures for RF facilities. These factors also were described in earlier reports. The text of this part notes where each factor was described in more detail in given earlier reports.

The fourth part of this report describes two broad approaches to regulating RF facilities and a set of features common to both approaches. Also listed are actions the County could take to implement each approach and feature and the likely results of using each. Using these approaches, features, and actions, the County can decide how it will regulate RF facilities and readily implement that decision.

Purposes. The consulting team will make presentations at several public meetings based on this report. Therefore one of the purposes of this report is to provide the subject matter for those presentations.

The ultimate goal of the telecommunications facility siting project is for the County to adopt new policies and regulations for such facilities. Regulations for RF facility sites will be prepared by or on behalf of the County, based on this and earlier reports and public responses to them.

PART II

SUMMARY OF PAST REPORTS

Considerable work already has been done in earlier phases of the project. Major reports were prepared about issues of health, engineering, law, land use planning, and institutions relating to RF facilities.

Those reports provide a state-of-the-art background in the subject. However they are voluminous. It would be impractical to reprint them here in their entirety.

Table 1 lists reports prepared to date for the project. The Regulatory Policies Report contains an annotated summary of those earlier reports. The summary of each report is organized by major subject headings in those reports. This will make it easier for someone reading this report to refer to an earlier report. The earlier reports generally contain more detailed discussion than presented in the summary.

To simplify referencing in the Regulatory Policies Report, each prior report, appendix, or addendum is assigned a citation number. The citation number appears on the left side of Table 1 corresponding to the text to which it refers. The citation number is used only in the Regulatory Policies Report.

TABLE 1

CITATIONS TO PRIOR REPORTS

CITE	REPORT
1	Health report
	General description of radio-frequency radiation General description of biological effects of NIER Exposure standards Controversial aspects Deficiencies in radio frequency bioeffects data base Bibliography
2	Appendix A: Summary of BIOLOGICAL EFFECTS OF RADIOFREQUENCY RADIATION.
3	Appendix B: Reprint of "Assessment of the Biological Effects of Radiofrequency Radiation."
4	Appendix C: Reprint of "Epidemiologic Studies of Microwave Effects."
5	Appendix D: Translation of "Changes in [Soviet] Microwave Radiation Exposure Standards."
6	Appendix E: Translation of "[Chinese] Safety Exposure Standard of Microwave Radiation."
7	Appendix F.1: Reprint of "Likelihood of High Rates of Energy Deposition in the Human Legs at the ANSI Recommended 3-30-MHz RF Safety Level."
8	Appendix F.2: Reprint of ANSI SAFETY LEVELS WITH RESPECT TO HUMAN EXPOSURE TO RADIO FREQUENCY ELECTRO-MAGNETIC FIELDS, 300 kHz to 100 GHz (C95.1-1982).
9	Appendix G: Reprint of "Development and Application of New Radiofrequency Radiation Safety Standards."
10	Appendix H: Reprint of "Microwave Biological Effects."
11	Appendix I: Reprint of "Soviet and European Research on Biological Effects of Microwave Radiation."
12	Appendix J: Reprint of "Frequency and Power Windowing in Tissue Interactions with Weak EM Fields."
13	Appendix K: Reprint of "Editorial - Differing Radiofrequency Standards in the Microwave Region -- Implications For Future Research."
14	Appendix L: Reprint of "History of Biological Effects and Medical Applications of Microwave Energy."

(continued)

TABLE 1 (continued)

CITE	REPORT
15	Engineering report
	Rationale for Siting of RF Facility Structures Calculating NIER Levels Measurement of NIER Levels Reprint of "Prediction Methods" from Office of Science & Technology Bulleton 65 Bibliography
16	Appendix A: Reprint of ANSI Radiation Guidelines
17	Appendix B: FM Broadcast Tables and Figures
18	Appendix C: TV Broadcast Tables and Figures
19	Appendix D: AM Broadcast Tables and Figures
20	Appendix E: Partial reprint of "An Engineering Assessment of the Potential Impact of Federal Radiation Protection Guidance on the AM, FM, and TV Broadcast Services."
21	Appendix F: Reprint of "RF/Microwave Measurements."
22	Appendix G: Reprint of "Multiple Source, Multiple-Frequency Error of Electric Field Meter."
23	Appendix H: Reprint of "Instrumentation for Measurement of Radiofrequency Electromagnetic Fields: Equipment, Calibration, and Selected Applications."
24	Addendum 1: Interference from AM and FM broadcast stations and FCC BC Docket # 82-186.
25	Addendum 2: Estimation of equipment and manpower costs of NIER measurement capability.
26	Addendum 3: Economic impact of proposed King County NIER standard and a reprint of "An Estimate of the Costs of Guidelines Limiting Public Exposure to RF Radiation from Broadcast Stations."
27	Legal issues report
	Federal constitutional and statutory issues State statutes County plan and code Citations
27-A	Aesthetic/Property Value Issues

(Continued)

TABLE 1 (continued)

CITE	REPORT
28	Land use issues report
	Classification and characteristics of users
	Characteristics of transmission towers
	Effects of transmission facilities
	Samples of local transmission facility provisions
29	Exhibit 1: Draft Boulder County plan policies
30	Exhibit 2: Draft Portland ordinance
31	Exhibit 3: Multnomah County ordinance
32	Exhibit 4: American Planning Association ordinance
33	Addendum report
34	Institutional issues report
	Background
	County policy
	Recent applications
35	Inventory of sites
36	Forecast of additional television, radio, and microwave tower sites in King County, 1986-1990
37	Task 2 Report
	Summary of transmission facility effects
	Summary of legal, institutional, and policy issues
	Summary of characteristics of transmission facilities
	Ranking of facilities by type and effect
38	Task 3 Discussion Draft
	Where to put transmission facilities
	Assessment of siting alternatives
	How to implement selected options
39	RF discharges from multiple users

SUMMARY OF HEALTH ISSUES REPORT

Description of radio-frequency electromagnetic radiation

The purpose of telecommunications is to transmit and receive information. This information is transmitted by means of electromagnetic energy or radiation. This energy consists of related electric and magnetic fields. (Cite 1, pp. 1 - 4)

Once an electric field is produced, it will create a magnetic field and vice-versa. The result is a self-sustaining, self-propagating wave composed of both an electric and magnetic parts. Electric fields are measured in volts/meter (V/m). Magnetic fields are measured in amperes/meter (A/m). (Cite 1, pp. 4, 13)

The rate at which energy radiates through space also is used to describe that energy. This rate is called "power density." It is expressed in watts/unit area. For purposes of this project, power density is most conveniently described in microwatts/square centimeter (uW/cm^2). The power density of a given energy source is 1/1.2 pi times the square of its electric field strength or 12000 pi times the square of the magnetic field strength.

Generally the power density of a given energy source decreases as the inverse square of the distance from that source. That is, each time the distance from the source is doubled, the power

density is $1/2^2$ or 1/4 of that at the first point. (Cite 1, pp.13 - 14)

A transmitting antenna is powered by alternating electric current. The current is a flow of electric charges that change from positive to a negative charge at a rapid rate.

The number of times a given current changes from a maximum positive level through a maximum negative level and back to a maximum positive level on one second is called the "frequency" of the current. Frequency is described in terms of cycles per second or "Hertz" (Hz).

The current in an antenna creates electric and magnetic fields that oscillate in time at the same frequency as the current. These fields move away from the antenna at the speed of light (186,000 miles per second) for an infinite distance unless they are affected by objects or other fields in their path. (Cite 1, pp. 5 - 6)

The distance between points of corresponding phases of a periodic wave of two constant cycles is called its "wavelength." Wavelength is equal to phase velocity divided by frequency or the ratio of the frequency of the oscillating fields with the distance they travel in 1 second.

The range of electromagnetic energy is vast. It is described commonly as a spectrum of frequencies and corresponding

wavelengths. Figure 1 shows the electromagnetic spectrum. Only a portion of the spectrum is used for RF facilities addressed in this project.

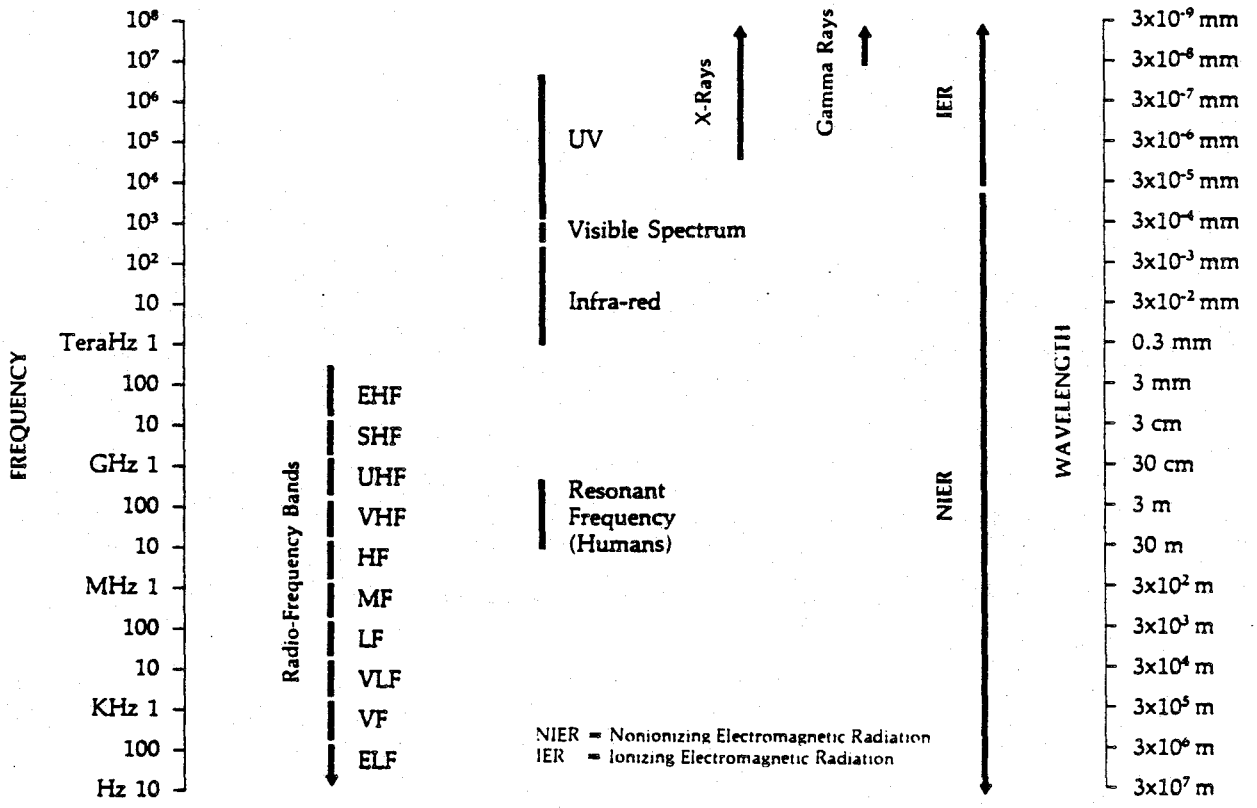
Different kinds of RF facilities use different portions of the spectrum. Table 2 shows the frequencies that are used by various kinds of RF facilities. (Cite 1, pp. 7 - 9)

Energy at frequencies more than 10^{15} Hz can ionize molecules and change the chemical structure of living tissue. It is called "ionizing energy."

Energy with a frequency from 1 Hz to 10^{15} Hz is called "non-ionizing energy," because it does not ionize living tissue.

Ionizing energy is dangerous. However it is not a concern in this project, because RF facilities do not use or cause ionizing energy. All frequencies used for telecommunications are within the non-ionizing range.

FIGURE 1. ELECTROMAGNETIC SPECTRUM



Source: ITT Radio Engineer's Handbook, 1979.

TABLE 2 TYPICAL USES BY FREQUENCY RANGES

Frequency	Wave-length	Band Designations	Typical Uses	Wave Type
300 GHz	10 mm	EHF—Extremely high frequency	Satellite communications; Radar; Microwave relay; Radionavigation, amateur.	Millimeter waves
30 GHz	1 cm	SHF—Super high frequency	Satellite communications; Radar; Amateur; Microwave relay; Airborne weather radar.	Microwaves
3 GHz	10 cm	UHF—Ultrahigh frequency	Short-range communications; Amateur; Taxi; Police; Fire; Radar; Citizens band; Radionavigation; UHF TV; Microwave ovens.	Microwaves
300 MHz	1 m	VHF—Very high frequency	Police; Fire; Amateur; VHF TV; FM.	Radar
30 MHz	10 m	HF—High frequency	Citizens band; Amateur; Voice of America broadcast; International communications; Medical diathermy.	
3 MHz	100 m	MF—Medium frequency	Communications; Radionavigation; Marine Radiophone; Amateur; AM.	Ultrasonics
300 kHz	1 km	LF—Low frequency	Radionavigation; Marine communications; Long-range communications.	
30 kHz	10 km	VLF—Very low frequency	Very long-range communications.	
3 kHz	100 km	VF—Voice frequency	Voice, audio.	
300 Hz	1,000 km	ELF—Extremely low frequency	Seafarer; Power lines; Audio.	
30 Hz				

General description of biological effects of NIER

Non-ionizing energy also can affect living tissue, but it does not ionize human tissue and it does not affect living tissue the way ionizing energy does.

Non-ionizing energy can induce electric currents that can be perceived as a shock or burn. Also it can induce motion in objects with high water content, such as human tissue. The effect of this motion is perceived as frictional heat. (Cite 1, pp. 9 - 12)

All transmission facilities emit non-ionizing electromagnetic radiation (NIER). This energy may affect human beings under some conditions. Experts dispute how much and under what conditions effects begin to occur and the significance of those effects. The dispute is hard to resolve. (Cite 13)

Among the health measures that have been studied are cellular and subcellular systems, hematologic and immunologic systems, reproductive systems and genetics, central nervous system, behavior, cataracts, auditory system, endocrine system, metabolism and growth, cardiovascular system, longevity and mortality, carcinogenesis and mutagenesis, shock, burns, and effects on pacemakers. Most are studies of non-human subjects. (Cite 1, pp. 28 - 45; Cite 2, pp. 21 - 62; Cite 3; Cite 4; Cite 10; Cite 11; Cite 13; Cite 14)

Generally effects of NIER are described in terms of the rate at which a body absorbs RF energy, known as the "whole body averaged specific absorption rate" (SAR). This is the average rate of energy absorption per unit mass of tissue. It is expressed in terms of watts/kilogram (W/kg). (Cite 1, pp. 15 - 16)

However a body exposed to a given amount of RF energy can have many times the average whole body exposure rate in certain areas of the body, such as the ankles and wrists. (Cites 7, 12) The amount of energy absorbed by a given region of the body depends on the features of the fields created by an energy source, proximity of other objects, and the size, shape, and dielectric properties of a body receiving the energy. (Cite 1, pp. 19 - 21)

The effect of RF energy also varies with the frequency of the energy. Humans are affected most by frequencies in the 30 to 300 megahertz (MHz) range, because they absorb more energy from wavelengths in these frequencies. Frequencies in this range are called "resonant frequencies."

A standard to prevent RF energy from affecting people should allow the least amount of energy in the resonant frequencies. Progressively higher levels of energy at frequencies above and below resonant frequencies can be allowed, because people will absorb less of the energy. (Cite 1, pp.15 - 19)

High levels of RF energy cause a body to heat in potentially hazardous amounts. Lesser amounts of RF energy also heat a body. Much of that energy is accommodated by the body's thermoregulatory system without adversely affecting the body over time. (Cite 2, pp. 5 - 20)

There also may be effects from RF energy that do not result from heating. These are referred to as "non-thermal" or "athermal" effects. Although research on this subject has been conducted, there is no consensus in the scientific community that RF facilities cause non-thermal effects or that they are significant over time.

RF energy can cause burns at power densities much lower than those at which thermal effects occur. A burn can result when a person who is insulated from the ground touches a grounded metal object or a person in contact with ground touches an ungrounded metal object.

This burn is caused by an induced current. It is most likely to occur under whole body exposure at frequencies in the resonant range or lower (i.e., less than 300 MHz).

The induced current from contact with ungrounded objects can be limited by grounding the objects. Induced currents could be regulated as well as RF energy levels, such as power density, to protect against such effects. (Cite 1, pp. 42- 43; Cite 12)

Research about induced currents is developing rapidly. While ready means to predict, monitor, and mitigate them are not available yet, work is underway to create and test them. The County should consider amending RF regulations to incorporate the results of this work.

There are many possible health effects of RF energy. We cannot be certain how much RF energy is needed to cause each effect. There is a consensus among experts that RF energy causes adverse thermal effects at an SAR as low as 2 watts/kilogram (W/kg). Other thermal effects can be detected at an SAR as low as 1 W/kg.

There is no consensus that long-term adverse thermal effects occur below 1 W/kg. There is not enough evidence of long term exposure to an SAR less than 2 W/kg to say whether or not it poses thermal or non-thermal risks to the general public.

Exposure standards

It is possible to compute how much RF energy at a given frequency and power will cause a given SAR in humans. (Cite 1, pp. 45 - 46) Based on those computations many countries, and industry, military, and public health and safety groups have adopted NIER exposure standards and guidelines. (Cite 8; Cite 9; Cite 13; Cite 14, pp. 1194 - 1196) Table 3 shows many such standards.

TABLE 3 --- SELECTED NIER STANDARDS

SOURCE OF STANDARDS	FREQUENCY	GENERAL PUBLIC	OCCUPATIONAL
ACGIH [1]	30 - 100 MHz	1 mW/cm^2	
ANSI [2]	30 - 300 MHz		1 mW/cm^2
Canada	1 - 300 GHz	1 mW/cm^2	5 mW/cm^2
Czechoslovakia	.3 - 300 GHz	25 Uw/cm^2	
IRPA [3]	10 - 400 MHZ	200 Uw/cm^2	1 mW/cm^2
Massachusetts	30 - 300 MHz	200 Uw/cm^2	
Multnomah Co.	30 - 300 MHz	200 Uw/cm^2	
NCRP [4]	30 - 300 MHz	200 Uw/cm^2	
Portland (draft)	30 - 300 MHz	200 Uw/cm^2	
United States	30 - 300 MHz	1 mW/cm^2	10 mW/cm^2
USSR	40 - 300 MHZ	10 Uw/cm^2	25 Uw/cm^2

[1] American Conference of Governmental Industrial Hygienists

[2] American National Standards Institute

[3] International Radiation Protection Association

[4] National Council on Radiation Protection and Measurements

NOTE: Some figures have been simplified for presentation. For instance, most standards allow the permitted power density for frequencies other than those listed to be higher than the figures on the table. Also most standards listed are for power density averaged over some period of time. Some standards vary with exposure time. Time-dependent variations are not shown. Also the Soviet standard is for power density for a given electric field. The figure for power density for magnetic field-based measures is much higher and is not shown.

The difference between these standards often results from the disagreement about what level of energy absorption (and corresponding SAR) will affect humans.

For instance the ANSI and Multnomah County standards are based on the assumption adverse effects occur at an SAR of 4 W/kg. The draft Portland standard is based on the assumption adverse effects occur at 2 W/kg.

Another reason for the differences stems from disagreement about what "safety factor" to apply in light of the unknowns about human health effects of RF energy.

There is a consensus that a health standard should include a safety factor, so the amount of RF energy allowed is much less than the amount known to cause an adverse effect under worst case conditions. Typical safety factors allow 1/10 or less of the amount of energy known to have an effect, adverse or otherwise.

For instance the ANSI standard uses a safety factor of 1/10 the amount of NIER known to cause adverse effects. The Multnomah County standard uses a safety factor of 1/24.

The safety factor and SAR assumptions are related. For instance the Multnomah County standard uses a higher safety factor than Portland although it allows higher SARs. The Portland standard is intended to allow lower SARs, but includes less of a

safety factor. Therefore even though the Multnomah County and draft Portland standards are based on different assumptions about SAR, they provide roughly equal protection because of corresponding differences in safety factors.

Another difference among standards results from the population to which they are applied. Standards intended for the workplace generally allow more RF energy than standards intended for the general population. This is because exposure in a workplace generally is the result of the worker's conscious and free choice to work in that business. A member of the public who lives or plays near a source of RF energy does not have the same degree of choice to relocate. Also workplace exposure generally is for 8 hours or less, whereas someone who resides near a source of RF energy may be exposed to that energy 24 hours a day.

Controversial aspects

There is a marked difference between standards in the West and in the Communist Block. This creates the appearance that the Communist Block countries enjoy more protection than elsewhere. However much of this difference can be discounted due to differences in methodology and enforcement. Also the standards are moving closer over time. (Cite 1, p. 48; Cite 5; Cite 6; Cite 8; Cite 9; Cite 11)

There are reports of non-thermal effects from exposure to RF

energy at SARs below 1 W/kg. (Cite 2, p. 62) However such effects are discounted due to poor scientific methods or are limited to narrow circumstances. (Cite 12; Cite 14) This is a subject of on-going research. Whatever standard is adopted should be amended when a consensus about such effects is reached by the scientific community.

Deficiencies in radio frequency bioeffects data base

It is hard to resolve the dispute about health effects of RF energy, in part, because concern about health effects of RF energy is relatively new. Research methods and tools have had to be created to study the issue. In many cases those methods, tools, and studies have been criticized, because they do not adhere to tenets of commonly accepted scientific methods. (Cite 1, pp. 39 - 40; Cite 2, pp. 3 - 4; Cite 3; Cite 13)

Many studies of health effects of RF energy are not reported in enough detail, so factors that might contribute to reported effects cannot be identified. Many results have not been replicated, so their validity is inherently suspect.

Few studies have been done on humans. Particularly needed are studies of the effects of long term exposure to low levels of RF energy on humans. (But see Cite 2, pp. 54 - 56; Cite 4, pp. 79 - 81; Cite 11, pp. 85 - 87) Studies of effects on animals and in vitro solutions are limited generally to a few frequencies. They

are hard to extrapolate to humans, because RF energy effects vary greatly with the size and thermoregulatory systems of subjects.

Also most studies are done for whole body exposure. While it is known that some areas of the body absorb more RF energy than other areas, it is not known how to relate whole body SARs to RF energy absorption by specific parts of the body. (Cite 1, pp. 15 - 17, 20 - 22, 49 - 50; but see Cite 12)

Many studies that purport to show an effect are done on animals under drugs. The drugs affect the results in ways that are not understood yet. Other environmental variables, such as ambient temperature, humidity, and age of a subject, are known to affect the human thermoregulatory system. Therefore an aged person exposed to high ambient temperatures and RF energy is more likely to be subject to thermal effects. But how those variables change the effect of RF energy on humans has not been described in enough detail to be used in standard setting. (Cite 1, pp. 50 -51)

Although the scientific data base for predicting the thresholds of biological effects resulting from heating and electric shock due to whole body exposure to RF energy is adequate, there is insufficient scientific information for accurately predicting thresholds for biological effects due to partial body exposures and other mechanisms of interaction.

SUMMARY OF ENGINEERING ISSUES

Characteristics of telecommunications facilities

There are many kinds of telecommunications facilities. They vary in users, the frequencies at which they transmit, the power with which they transmit, the kinds of sites and structures they need, and their capacity for sharing. Common facilities are described on Table 4.

Some RF facilities require an unobstructed line-of-sight pathway between origin and reception. Others need an unobstructed line-of-sight from origin to reception, but need to be obstructed from other RF signals to prevent interference. AM radio facilities do not need an unobstructed line-of-sight. (Cite 15, pp. 1 - 4; Cite 28, pp. 26)

A signal that is affected by obstacles between a transmitter and receiver can be captured and relayed over or around obstacles by what is called a "repeater".

Some RF facilities transmit in all directions. The area within which the signal can be received is a function of the height of the antenna, the frequency and strength of signal, and the surrounding terrain.

TABLE 4 CHARACTERISTICS OF USERS OF RADIO FREQUENCIES

	Public Radio Services		Private Radio Services		
	AM Radio	FM Radio/ Television	Land-Mobile Systems	Fixed-Point Microwave	Amateur
Users	Radio stations on AM band.	Radio stations on FM band; TV stations on VHF band, (channels 2-13); TV stations on UHF band, (channels 14-83).	Public safety (police, fire, medical emergency); Private business; Land transportation; Common carriers.	Private businesses; Public agencies.	Private individuals.
Frequency	Medium (.5—1.6 MHz)	Very high: VHF-TV (54-216 MHz); FM (88-108 MHz). Ultrahigh: UHF-TV (470-890 MHz).	Very high (150-170 MHz); Ultrahigh (450-470 MHz; 800-950 MHz).	Ultrahigh (1,000+ MHz).	Various bands between medium (1.6 MHz) and Ultrahigh (1,000 MHz).
Power	Maximum: 50,000 watts.	FM maximum: 100,000 watts. VHF-TV maximum: 100,000 watts (channels 2-6); 316,000 watts (channels 7-13). UHF-TV maximum: 5,000,000 watts. Low-power TV maximum: 100 watts (VHF); 1,000 watts (UHF).	Maximum: 350 watts. Typical: 60-100 watts.	Typical: 10 watts	Maximum: 1,500 watts.
Optimal Location	Site with wet soil to facilitate transmission of ground waves.	Highest elevation in service area.	Highest elevation in service area.	Adequate elevation to ensure direct line of site between points.	Highest elevation in area optimum but generally not available/convenient for private operator.
Tower Requirements	Up to four or more towers in various spatial configurations.	Tall towers up to 2,000 ft. in height; shorter towers possible for FM antennas.	Towers ranging in height from 60-150 ft., although can be larger.	Self-supporting towers; 100-150 ft. usually sufficient.	Towers ranging in height from 40-100 ft.
Site Requirements	Large area to accommodate several towers.	Large area to accommodate tall towers.	Small parcels adequate; some distance from other towers to minimize interference.	Relatively small sites.	Relatively small; often located in operator's back-yard.
Capacity for Shared Use	Technically feasible but locations often unsuitable for other users.	Limited capacity for shared use with other TV and FM due to size and weight of antennas. Significant capacity for shared use with private land-mobile services.	Technical capacity to share space on TV and FM towers.	Capacity for shared use particularly with private land-mobile services.	Technically feasible for shared use with land-mobile services, but both FCC and some local zoning codes prohibit use of tower for commercial purposes.

Other RF facilities transmit in one direction. Microwave transmissions are highly directional. A microwave signal is beamed between 2 specific points in a narrow route. It uses much less power than other kinds of RF sources, because the energy can be focused. RF energy outside the main beam of a microwave facility is negligible.

Television and radio transmissions can be directional also. Sometimes directional antennas are used to prevent a new source from interfering with signals from an existing source with higher priority under FCC rules or to avoid being subject to interference from such an existing facility.

RF transmissions can be one-way --- such as radio and television broadcasts --- or two-way --- such as common carrier and public safety communications. (Cite 28, pp. 27 - 32)

Characteristics of telecommunications structures

The 2 basic kinds of transmission towers are the guyed mast type and the self-supporting type. The type of tower used depends on technical, engineering, and economic factors.

A guyed mast tower typically is built of steel lattice or tubular steel and held in place by guy wires. As a general rule, guy wires extend outward from the base of the tower 1/3 to 2/3 the height of the tower.

A self-supporting tower typically is square, triangular, or pyramidal in cross-section and built of steel lattice, tubular steel, reinforced concrete or wood. Often such a tower has a much larger base and bulkier members than a guyed tower that supports the same devices, but occupies a much smaller overall area, because there are no guy wires for support. (Cite 28, p. 32)

A tower for many RF facilities (other than AM radio) can support more than 1 antenna. The top of the tower is the optimum location, but antennas can be attached to the sides or on cross bars or other attached structural members.

However sharing can be hard to do. a site for one user may not be situated to best serve the needs of another user. Sharing can increase greatly the cost of a structure. It can disrupt or interfere with other users on a shared tower. It is hard to manage a shared use site, and can be hard to secure against harm. (Cite 28, pp. 33 - 36; Cite 38, pp. 4 - 5. 19 - 23)

Another structure commonly associated with RF facilities is a microwave dish or horn. Such dishes vary considerably in diameter or aperture area and locational needs depending on their purpose.

One or more relatively small dishes --- typically less than 15 feet in diameter --- can be placed on a transmission tower or

similar structures if there is an unobstructed line-of-sight between the dish and the facility transmitting to or receiving from it. Because a microwave signal must be sent precisely from point to point, most structures for microwave facilities do not use guy wires for structural support. A guyed tower can sway.

Large microwave dishes, such as used commonly for earth stations, are not placed on towers. Large earth station dishes typically are placed on a cradle-like structure. The structure is attached to a concrete base that is situated on or below grade, (to minimize potential interference), with a line-of-sight between transmitter and receiver.

Engineering rationale for telecommunications facility siting

Most RF sites are selected by the industry based on the need to provide and/or receive a given signal strength over a given area with the least interference at the lowest cost.

If an RF facility can achieve its purpose on the same site as the user, it often is cheaper and easier to put it there. Commonly such a site works for users only at that site. These facilities are situated in what looks like a random pattern, or are based more on user location rather than elevation. Users are spread throughout the region.

Elevation also might be less important if the area within which transmissions are sent and received is small, or if a facility

only receives transmissions from highly elevated sources, such as a satellite.

If the potential for interference is high, or if a facility relies on highly directional or low power transmissions, surrounding obstacles outside the path of transmissions may aid an RF facility.

Some RF facilities need an environment with certain natural characteristics. For instance, AM radio facilities often are situated in damp lowland soils to facilitate ground wave transmissions. (Cite 15, pp. 1 - 4)

Calculating NIER levels

Methods for calculating the amount of NIER at ground level from a given antenna have been published for the Federal Communications Commission by the Office of Science and Technology, based on formulas developed by the US Environmental Protection Agency. The accuracy of these methods has been verified by measurements on the ground. (Cite 15, pp. 4 - 7 and pp. 20 - 32; Cite 16; Cite 20)

The methods can be used to project the electric and magnetic field strength on the ground at a given distance from a given antenna transmitting at a given power. These projections can be graphed for ease of use. (Cites 17 - 19) However such graphs do not deal with a site where more than 1 source of RF energy is

transmitting at the same time.

The total amount of RF energy in an area where more than 1 source of RF energy is transmitting at the same time can be measured. However a more accurate means of determining total RF energy levels is to measure the separate contribution of each source and add the results for each frequency range.

When adding the separate contributions of multiple sources, distinguish between frequency ranges. Most RF energy standards recognize 5 frequency ranges. See the ANSI standard for an example. Each frequency range will have its own limit, because the potential effect of RF energy on people depends on the frequency of the energy. The greatest potential effects are in the resonant frequencies --- the 30 to 300 MHz range. (Cite 15, pp. 12, 34; OST 65)

Measuring NIER levels

It takes skill, experience, time, and the proper tools to measure RF energy accurately. Measurements in an area that contains many RF sources or that contains objects that could distort RF energy fields take the more time and effort. (Cite 22)

Two kinds of measuring tools are used most often. One is called a broadband meter. If used properly it can measure the total field from all sources in all directions.

Another kind of tool is a narrow band meter. If properly used it can measure the amount of energy contributed in each frequency where more than 1 RF facilities have transmitters nearby each other.

Other tools may be needed to measure accurately RF energy levels caused by microwave facilities, including a spectrum analyzer, calibrated horn antennas, and waveguides.

Several manufacturers now build tools to measure RF energy fields and power density levels. Each tool has its limitations and advantages. None is suited or all uses.

The US EPA and a few researchers have built more expensive, sophisticated measurement tools than are available in the market. While more accurate, these tools require more highly trained staff and more time. (Cite 23)

Care must be taken to avoid inducing errors due to the misuse of equipment or the failure to adapt to surrounding conditions. Many kinds of errors can be caused. In a complex RF environment, measurements can be verified by using more than one tool. Different kinds of probes, attenuators, and antennas may be needed to enable each tool to work in a given environment. Also to avoid errors about the RF energy emitted by a given RF source in a multiple-source environment, other transmitters in the area may have to be turned off. (Cite 15, pp. 7 - 12; Cite 21)

Cost of NIER measurement

A broadband meter can measure ambient RF energy levels down to as little as a few microwatts per centimeter. Although a broadband meter does not distinguish between frequencies, it can show whether ambient RF energy levels in the area of proposed or problematic RF facility warrant more detailed and expensive measurements using a narrow band meter or spectrum analyzer.

To measure RF energy accurately, a person must be trained in physics and engineering and in the use of each tool. But there are no generally recognized training programs.

To acquire broadband and narrow band meters and accessories for them would cost about $22,000 in late 1986. To acquire equipment to measure microwave transmissions would cost about another $35,000. To conduct the kind of areawide survey done by the US EPA on Cougar Mountain would cost about $30,000 exclusive of equipment. There is no estimate of what it would cost to train someone to use this equipment or to maintain it or their expertise. (Cite 25)

Economic impact of an NIER standard

The economic impact of an NIER standard will vary depending on whether such a standard applies to existing as well as new facilities, and on what level of NIER emissions is allowed.

Assuming the County adopts a set of frequency-dependent standards, and that 200 uW/cm^2 is the maximum ambient power density allowed in the 30 to 300 MHz range, 2 or 3 existing facilities on Cougar Mountain will not comply, based on the EPA study.

It will cost up to $200,000 to raise and replace 2 FM antennas that now operate on separate, relatively low towers on the mountain.

It will cost several thousand dollars to complete detailed measurements around a few sites on the mountain to determine whether they will comply with a 200 uW/^{2} standard. If they do not comply, it would cost $200,000 to raise and/or replace those antennas or perhaps somewhat less to acquire property where NIER exceeds the standard, if that property is available.

If will cost less than $10,000 to install warning signs and install or replace fences at most other RF facility sites on Cougar Mountain and elsewhere in Clark County to ensure the general public is not subject to NIER in excess of a 200 uW/cm^2 standard in the resonant frequencies.

For future RF facilities, the cost of complying with an RF energy standard depends on how much it costs to measure existing ambient RF energy levels, and to design or install facilities to prevent them from exceeding the standard. These costs can vary

from a few hundred dollars for an isolated low power facility on a large site, to more than $100,000 for a high power facility on a small site in a multiple user environment. (Cite 26)

SUMMARY OF LAND USE EFFECTS OF TELECOMMUNICATIONS FACILITIES

A transmission facility can have many kinds of effects. The presence and significance of these effects will vary with the type and size of a facility and with conditions around it.

Listed below are 13 kinds of effects that could be caused by a telecommunications facility and a summary of the circumstances under which they may occur. The potential effects are listed in order of their importance, based on a consensus of the members of the King County RF Facility Task Force.

Following the text is a table that lists each effect, factors used to describe or vary the effect, and mitigating measures that can reduce the effect.

1. Health Effects. Potential health effects due to exposure to RF energy are described at pages 8 through 21 of this report. See also Cite 38, pp. 6 - 8.

2. Land Use compatibility and aesthetics. A transmission facility may be small and unobtrusive or large and obtrusive.

If a facility is visually obtrusive, it may be incompatible with surrounding land uses, particularly residential uses, because it is so much larger than and different from surrounding structures. Such obtrusive structures may include guyed or

self-standing towers, large satellite earth stations, and transmission buildings.

A transmission facility that complies with setback, coverage, height, sign and other dimensional standards that apply to structures generally in a given zone is less likely to conflict visually with other permitted uses in the zone, because the RF facility is not as obtrusive as it would be otherwise.

Whether a transmission facility is incompatible with surrounding uses depends on the nature of the surroundings, the size of the site, the distance between the facility and its neighbors, the size and design of structures, and mitigating measures taken to reduce visual effects.

Mitigating measures typically include landscaping at the edge of a site, off-site, and around small structures and activity areas on-site. Some facilities, particularly receive-only ones, can be recessed into the earth, reducing the apparent size and visual effect of the facility. Also distance, lighting, design, materials, color, and accessory use limits can reduce visual effects. (Cite 28, pp. 42 - 45; Cite 33, pp. 9 - 13; Cite 38, pp. 8 - 10)

3. Structural safety. A transmission tower can fail structurally for a number of reasons, although such failures are rare. If a tower does fall, debris could be a hazard to people

and property nearby.

Whether failure of a transmission tower would be a hazard depends on the size of the site, the proximity of structures and people to the site, the failure characteristics of the tower, (i.e., whether it jackknifes in the middle or spirals incrementally), and the connecting devices between the tower and an antenna or dish.

The potential for tower failure is small if a tower complies with applicable building codes. Additional protection can be provided by ensuring the people who build the tower are qualified, ensuring the tower is maintained, and taking measures to reduce the potential for failure due to sabotage.

In the unlikely event a tower fails structurally, the tendency is for a tower to fall within the circumference of its guy wires. (Cite 28, pp. 45 - 46; Cite 38, pp. 45 - 46)

4. Electromagnetic interference. Electromagnetic energy emitted by a high power RF transmission facility may disrupt or distort electric devices in their vicinity. This can affect such consumer goods as garage door openers, video recorders, radios, telephones, televisions, and some appliances. Receive-only facilities do not cause interference.

Whether such effects occur depends on the quality of consumer devices near a transmission facility, the radiation pattern,

power, and frequency of the transmission, and the quality of installation of both kinds of devices.

The FCC has exclusive jurisdiction over interference between and among transmission facilities it licenses. The rules vary for each type of RF facility and interference.

FCC rules require broadcast licensees to satisfy at no cost to the consumer most interference complaints received by the licensee within a year after a license is issued. Thereafter a licensee must provide information and help complainants remedy interference with consumer devices. Often interference can be corrected by shielding or putting filters on the consumer device or altering radiation patterns of transmitting equipment.

Some consumer devices are not protected by this rule, including mobile receivers and non-RF devices such as tape recorders, hi-fi amplifiers, and phonographs.

If an RF facility does interfere with a consumer device, the FCC can assist the parties to correct the problem. The FCC publishes a manual that describes how to deal with RF interference with household goods. (Cite 24; Cite 28, pp. 47 - 48; Cite 38, pp. 11 - 12)

5. Public access/nuisance. A large transmission facility site can be an attractive nuisance. It can be subject to trespass, vandalism, and sabotage. It can become a meeting place for

people who create noise, litter, and other adverse effects.

Whether such effects occur depend on whether public access to the site is practicable, whether staff patrol or monitor the site, and whether the site is improved with structures that can be vandalized.

Such effects can be prevented by fencing and monitoring the site. (Cite 28, p. 49; Cite 38, pp. 12 - 13)

6. Ice fall. Ice can collect on a transmission tower and tower guy wires. As it melts, this ice can fall. If it falls from extreme heights, it could be carried a long distance by high winds. If the ice pieces are large enough, they could cause harm where they land.

Whether this effect occurs depends on tower height and on prevailing winds. Whether this effect is significant depends on the size of the site and the proximity of structures and people to the site.

The potential for adverse effects can be reduced by requiring a transmission facility site to be large enough to accommodate ice fall or providing deflectors to direct or contain ice fall. Ice can melt on an antenna for a high-power transmitting devices, if de-icing equipment is installed. A tower could be wired so it too heats, but the cost and amount of energy consumed would be high. (Cite 28, p. 45; Cite 38, p. 13)

7. Noise. A transmission facility can cause noise in at least 2 ways. Noise is caused during construction by vehicles and heavy equipment. Noise also can be caused by generators and cooling system fans. Generator noise occurs commonly 15 to 30 minutes each week or two when a generator is tested. A generator could cause noise for longer durations during an emergency or occassional maintenance. Fans operate continuously or repeatedly every day.

Whether these noise sources are an adverse effect depends on the ambient aural environment and on whether people live or work nearby where they would hear the noise.

Washington and King County have noise control laws that should mitigate the potential for a transmission facility to cause excessive noise. However a facility could degrade an existing quiet environment without violating state or county noise standards. (Cite 28, p. 44; Cite 33, pp. 5 - 9; Cite 38, pp. 13 - 14)

8. Property value. A transmission facility may have an affect on the value of surrounding residential properties. However it is difficult to determine whether such effects will occur, and, if they do occur, how long they last, how many people and properties are effected, and how much the effect might be.

Portland found transmission facilities do not affect property

value. Six of seven county assessors in Washington and Oregon reported they do not devalue property next to a transmission facility. One county does devalue property next to large transmission facilities in some cases, although they do not base the devaluation on comparable sales prices. A recent study of a proposed 190 foot tall tower in the Clark Lake area concluded the proposed facility would reduce property value less than 1%. There is a consensus that if effects occur, they are limited to properties very near a facility.

Studies of somewhat analogous situations suggest the presence or absence of a transmission facility in a given area is not as important to real estate value as other factors, such as elevation, slope, infrastructure, and proximity to schools, jobs, shopping, and recreation.

It is inevitable that some people would not want to live next to or near a large transmission facility or that they would not pay as much for the property as the owner feels it is worth. The extent of such effects, that is how many people would not buy or would pay less for a property near a transmission facility, is unclear. Also the duration of such effects is unclear. It is likely that such effects are decrease time and that adoption of local siting laws will resolve public concerns that could contribute to such effects.

To reduce the potential for property value effects, a facility

could be sited to minimize other potential effects, particularly views of the facility from nearby homes and public places, since it is these other effects that result in property value effects. (Cite 28, p. 47; Cite 33, pp. 16 - 20; Cite 38, pp. 14 - 15)

9. Sanitation and water. A transmission facility may need potable water and sanitary waste systems for on-site staff. Also the facility may use water to irrigate landscape materials.

Whether these needs are an adverse effect of a facility depends on the type of landscaping material and irrigation system used, the amount of water they require, the sensitivity of water supply, the amount of sanitary wastes likely to be generated, and the capacity of the subsurface or public sewer systems to accommodate the increased sewage load.

Potential adverse effects can be reduced by limiting when or how much water can be used, by requiring water conserving irrigation and plant features, and by requiring use of available public water and sanitary sewage systems with adequate capacity. (cite 28, pp. 46 - 47; Cite 33, pp. 2 - 4; Cite 38, p. 15)

10. Natural resource conflicts. A transmission facility can be situated where there are significant natural features. Those features can be affected by such a facility. For instance, existing vegetation or resource uses can be removed and displaced. Or a facility could reduce resource productivity

levels, temporarily degrade surface water quality, and change surface water routes and subsurface soil conditions.

Whether such effects occur depends on whether there are natural resources at a proposed transmission facility site, whether they are significant resources, and the extent a facility displaces or alters them.

Such effects can be mitigated by retaining existing natural features or resource uses to the extent practicable, by replacing vegetation that is removed, and by protecting water courses or similar features on the site during construction. (Cite 28, pp. 41 - 42; Cite 33, pp. 14 - 16; Cite 38, p. 16)

11. Open space and recreational conflicts. Depending on its location, a transmission facility can conflict with recreational and open space uses. If a transmission facility is situated on what was recreational land, it consumes that land and prevents its use for recreation.

If an RF facility adjoins but does not dispace recreational resources, it nevertheless may make it harder to reach those resources, because most RF facilities are fenced to prevent public access.

The extent of these adverse effects depends on the size of the facility site, the significance of the recreational resource, the nature of the limits imposed on the recreational resource by the

facility and the extent to which the facility reduces the existing open space character of the site.

A transmission facility site can be largely open space in character. If this is the case, a facility can be an open space amenity.

Adverse effects can be mitigated by protecting recreational land from excessive RF emissions, retaining existing open space characteristics of a site, providing public access through a site to adjoining recreational land, and replacing lost recreational resources elsewhere in the area. (Cite 28, pp. 38 - 41; Cite 38, pp. 16 - 17)

12. Traffic and parking. A transmission facility causes traffic. During construction traffic includes heavy equipment, trucks and cars. After construction traffic generally consists of light trucks and cars. These vehicles commonly have to park while their occupants construct, operate or maintain a facility.

Whether a transmission facility creates an adverse effect due to traffic depends on the amount and frequency of traffic it generates and the nature of surrounding land uses and roads. A small facility causes little post-construction traffic, with 1 or 2 trips per week common. A large facility can create significant traffic, particularly if it includes more functions than just those needed to receive and transmit signals, such as studios,

administrative offices, and vehicle or equipment storage.

To mitigate traffic effects, a transmission facility in a traffic-sensitive area could be required to provide adequate off-street parking, to limit vehicular access to collector or arterial streets, and to limit non-essential uses on the site. (Cite 28, pp. 44 - 455; Cite 38, p. 17)

13. Land consumption. An antenna, dish or horn can be mounted on an existing structure or it can occupy its own site. If it occupies its own site, it consumes land that could be put to another use.

The amount of land an RF facility uses varies. Typical site sizes for several kinds of facilities are listed on Table 4. Generally the taller a transmission tower, the more land it consumes, since the base of the tower or the guy wire anchors are farther apart to accommodate increased structural loads.

Land consumption might be important if an RF facility is proposed where there is competition for or a limited supply of the sort of land proposed for the facility. Typically this is the case where a facility is proposed in a residential or urban area. However even in such a case, other concerns and values are more important based on the ranking of effects by the King County RF Task Force.

If it is apparent that many transmission facilities will

compete for land in the same area, less land can be consumed by transmission facilities by sharing transmission towers and structures. However sharing can be hard to do, and has been successful only in part when required by a local government. Reserving land for transmission facilities also can reduce the competition. (Cite 28, pp. 36 - 38; Cite 38, pp. 17 - 18)

TABLE 5
SUMMARY OF POTENTIAL LAND USE EFFECTS

KIND OF EFFECT MITIGATION	FACTORS THAT DESCRIBE OR VARY THE EXTENT OF AN EFFECT	MITIGATION
1. Health	Radio frequency Power density & equivalent fields Orientation of receiver Type of tissue/system exposed Induced current Distance from receiver Intervening objects	Distance Shields Power limits Current limits Research Monitoring Grounding
2. Land use compatibility & aesthetics	Location Relative size and scale Lighting Color Material Sensitivity/significance Associated uses	Distance Landscaping Design limits Use limits Incentives
3. Structural safety	Tower failure characteristics Site size Proximity to nearby uses & people	Bldg. code Maintenance Monitoring Qualifications
4. Electromagnetic interference	Quality of consumer devices Radiation pattern & strength	Filters FCC action
5. Public access & nuisance	Proximity to public uses Monitoring of site Nature of structures on site	Fencing Signage Monitoring
6. Ice fall	Prevailing winds Weather Proximity to nearby uses & people Tower height	Distance De-icing
7. Noise	Duration Frequency Ambient noise levels Proximity to noise sensitive use Objects between source & receiver Timing Degradation vs. dysfunction	State limits County limits Shielding Timing limits Duration limits Distance

(continued)

TABLE 5 (continued)

KIND OF EFFECT	FACTORS THAT DESCRIBE OR VARY THE EXTENT OF AN EFFECT	MITIGATION
8. Property value	Land use compatibility Duration Area affected Proximity to structures & people Confounding factors Sensitivity	All above All below
9. Sanitation & water	On-site staff presence Landscape material type Irrigation system type Sensitivity of water supply Capacity/suitability of san. syst.	Staff limits Water limits Plant limits Recycling
10. Natural resources	Location Significance of resources Survival/sensitivity of resources Duration Loss vs. impairment	Prohibitions Incentives Sharing Replacement Protection
11. Open space & recreation	Location Displacement vs. restriction Size Retention/loss of open space char.	Incentives Prohibitions Replacement Access
12. Traffic & parking	Construction vs. operation Frequency of trips Quantity of trips Sensitivity of nearby uses & roads Associated uses	Parking min. Use limits Access limits
13. Land consumption	Structure type and size Competition Sensitivity	Sharing Districting Max. site size

SUMMARY OF LEGAL AND INSTITUTIONAL ISSUES

Legal issues. The County can regulate telecommunication facility siting under police power authority reserved to the States in the federal constitution, the delegation of that authority by the state legislature to the county, and the assumption and articulation of that power in the county charter and code. (Cite 27, pp. 2, 17) However the way the county regulates such facilities is constrained by federal law.

For instance, federal statutes delegate broad authority to the Federal Communications Commission (FCC) to license and regulate telecommunications facilities. The FCC has not prohibited local governments from regulating RF facilities, although it has overruled local government actions on occassion.

As an example, FCC rules require that antennas be sited to provide a given level of signal within a given area. Local governments cannot prevent antennas from being sited where necessary to provide a signal of sufficient strength over the area unless reasonable alternative sites exist.

Also FCC rules provide certain facilities have priority in the event of RF interference; local governments cannot alter those priorities.

If County actions directly conflict with a federal license,

frustrate achievement of federal policies, unreasonably restrain competition, or preclude the introduction of new communications services, the FCC could override such a County action. (Cite 27, pp. 7 - 10)

The National Association of Broadcasters has petitioned the FCC to preempt all local regulation of RF energy emissions. The Commission is expected to rule on the petition in 1987. The Commission could preempt local regulations in whole or in part or not at all.

The FCC has issued a rule that selectively preempts local authority regarding satellite receive-only facilities. That rule provides:

> State and local zoning or other regulations that differentiate between satellite receive-only antennas and other types of antenna facilities are preempted unless such regulations:
>
> a. Have a reasonable and clearly defined health, safety, or aesthetic objective; and
>
> b. Do not operate to impose unreasonable limitations on, or prevent, reception of satellite-delivered signals by receive-only antennas or to impose costs on the users of such antennas that are excessive in light of the purchase and installation cost of the equipment.

Regulation of satellite transmitting antennas is preempted in the same manner except that state and local health and safety regulation is not preempted. The FCC has a similar rule regarding ham radio antennas.

Based on this rule, the county can regulate all receive-only (and transmitting) facilities only if there is a reasonable and clearly defined health, safety or aesthetic objective and if does not impose excessive costs on such facilities.

The FCC recently adopted a rule that requires an application for a new facility or for renewal or change of an existing facility to include an environmental impact statement if the facility would emit more NIER than permitted under the 1982 standards promulgated by the American National Standards Institute (ANSI). When it was shown that a station in California violated ANSI standards off-site, the FCC required the station to modify its transmissions or site so as to comply.

The FCC rule applies the ANSI standard on and off-site. It applies to employees of a broadcaster, and cannot be waived by employees. In most cases an RF facility that complies with the ANSI standard on-site will expose the off-site public to far less NIER than allowed under the ANSI standard, because NIER dissipates rapidly with distance.

Other federal laws and rules give the Federal Aviation Administration (FAA) power to decide whether an RF facility at a given site would be hazard to air safety and to require painting and lighting of RF facilities over a certain size. Local government actions must be consistent with FAA requirements for lighting and painting. (Cite 27, pp. 12 - 13)

Other federal laws give various agencies authority to impose health and safety standards. However no federal agency has adopted a standard dealing with NIER. Therefore local governments are not precluded from doing so. Even if a federal standard is adopted, local standards might be able to be more stringent. (Cite 27, pp. 11, 14 - 15)

The way the County deals with existing RF facilities may differ from the way it treats new facilities. Generally a legally established facility is protected from laws adopted after the facility was built. Therefore even if a facility does not comply with a law adopted after the facility was built, the facility can remain and can be maintained.

However if the law is intended to prevent harm to the public, harm which is clearly shown to result from an existing facility, even an existing facility may be required to comply with a law adopted after the facility was built. (Cite 27, pp. 6; Cite 38, pp. 23 - 26)

Whatever regulations the County adopts, it should explain what each provision of the law is intended to accomplish and why and how it relates to the public health, safety, and welfare. It should be sufficiently clear to appraise people what is expected of them, and should provide procedures to protect rights to due process. (Cite 27, pp. 4 - 5)

Institutional issues. There are at least 3 main interest groups concerned about RF facility siting regulations. These include the telecommunications industry, the general public, and the various government agencies involved in siting such facilities. Each interest group has somewhat different concerns and goals. Table 6 shows a summary of those interests. (Cite 34, pp. 11 - 17)

The County has regulated RF facility siting for many years. The County Comprehensive Plan contains policies for such sites. The County Zoning Ordinance contains broad standards for such sites, and procedures for review of such sites. However the standards are so broad and the nature of concerns about such facilities is growing so quickly that the procedures and standards are not adequate either to the industry or the public. (Cite 34, pp. 1 - 10)

Past County actions have allowed RF facilities to be scattered throughout the region, with concentrations of the biggest facilities on selected elevated and lowland sites. Those concentrations were mapped and their facilities were described as part of this project. (Cite 35)

TABLE 6
SUMMARY OF ISSUES BY INTEREST GROUP

INTEREST GROUP	ISSUES
Federal Government	Preemption by federal statute or constitution Supremacy by federal statute in case of conflict Interstate commerce effects Taking of property rights Intergovernmental coordination
State Government	Constitutional and planning enabling authority SEPA procedures and standards for EA and EIS Interagency coordination
County Government	Charter authority and limitations Administrative efficiency Code classification, standards, compliance process Nature of appropriate conditions of approval Comprehensive plan policies Cumulative effects and clustering Application and information requirements Appropriate minimums for site size, aesthetics, utilities, roads, access restrictions Prevention of RF interference EA/EIS thresholds and standards
Industry	Reasonableness and clarity of standards & procedures Certainty of outcomes Flexibility to accommodate technologic changes Do not require variances Do not require sharing Appropriate standards for public access & landscaping Use standard like ANSI for health concerns Equal treatment for similar facilities More permissive EA/EIS threshold
Public	Prevent health effects due to emission of RF energy Prevent public from harm due to proximity to facility Protect aesthetic and property values Stringent EA/EIS thresholds

Expected industry demand for new facilities

It is hard to say how many more RF facilities will be built in the next decade, because the FCC has eliminated allocation limits that constrained such growth in the past. Also it is hard to say how many existing facilities will want or need to relocate to comply with new FCC rules and to compete.

It is likely that new facilities of every kind will be proposed during the next several years. Some of those facilities may be able to be accommodated on existing RF facility structures and sites. Some will be new RF facility sites, particularly 2-way radio facilities as accessory uses.

Some demand for new sites will be accommodated in the City of Seattle. The FAA recently raised the height limit for potential hazards to aircraft in airspace over the City. This is expected to mean new and existing TV antennas may be relocated to the top of Columbia Center. The height limit change and recent proposals for new shared RF facilities in the City may reduce the demand for some facilities to be sited in the County, particularly TV uses, if new in-City facilities are built.

At least 1 new facility for an AM radio station may be proposed for the area, and at least 3 existing AM radio licensees may relocate towers in the Green River Valley or Mercer Slough areas. (Cite 36, pp. 1 - 3)

Several new facilities for FM radio stations may be proposed, and more than a half dozen existing FM station licensees may relocate antennas. Some new and relocated FM antennas may be able to be accommodated on existing structures. (Cite 36, pp. 3 - 6)

The FCC recently adopted new classifications for FM stations. The new rules will tend to influence stations to relocate antennas so they are at least 300 meters, (slightly less than 1000 feet), above average terrain.

Attempts are being made by KSEA and KING FM stations to increase the heights of their Seattle towers. At least part of the justification for such a height increase would be to comply with the 300 meter minimum class C rules. It is not clear whether the City of Seattle and FAA will approve these proposals. It is unlikely that other sites that meet the 300 meter rule will be available in Seattle.

New AM facilities may be proposed instead of some FM stations, because topography in the region shadows FM transmissions, but does not affect AM ground waves. AM stereo can compete with and exceed the quality of FM stereo in some parts of the region.

Two or more commercial UHF TV stations may be proposed for elevated sites in the region. One or more stations may want to relocate or add to existing antenna sites. (Cite 36, pp. 6 - 9)

Many hundred 2-way antennas are likely to be licensed in the next several years. This is a very active and growing segment of the market. (Cite 36, p. 12)

Many point to point microwave facilities are likely to be proposed for sites in the County. This includes about 8 to 10 microwave relay facilities for cable TV and perhaps more than 100 microwave transmitting dishes and horns for government and industry use. Some of the microwave transmitters are likely to share new and existing structures.

For commercial use there will be at least as many receive-only microwave devices as transmit and receive devices. Also there will be a large number of non-commercial microwave receivers. (Cite 36, pp. 9 - 12)

Another kind of microwave facility --- satellite uplink --- also represents a growing segment of the market. More than 100 such uplinks may be proposed in the County too transmit data and to relay TV broadcasts and telephone conversations, with the number likely to increase over time. (Cite 36, pp. 13 - 14)

Lastly 5 to 10 relatively small cellular telephone transmitting antennas will be proposed each year as that market begins to become more popular. These facilities will be distributed in a grid-like pattern throughout the metropolitan region. (Cite 36, pp. 14 - 15)

Innovation is common in communications technology. New kinds of RF devices are made each year. New markets for the near future include simultaneous transmission off video and audio signals by television or TV and radio broadcasters and increased use of high frequencies for data transmission. New devices will include fiber optics, suitable for densely developed areas with high data transmission needs, and panel antennas and combining equipment and techniques that make it easier for more users to share a given antenna or structure.

PART III

VARIABLES FOR REGULATORY FRAMEWORK

One purpose of this report is to propose a framework to use in drafting regulations for telecommunications facilities. The following section describes the variables that should be considered when drafting such regulations.

The citations after the discussion about each variable refer to ordinances that base an RF regulation on the variable discussed in that part. These ordinances are included in the appendices of the Land Use Issues report. Each ordinance has a citation number assigned on Table 1 at page 7 of this report. If the County wants to include a given variable in its regulatory scheme, the cited language shows how the variable can be used in an ordinance format.

TYPES OF FACILITIES

There are many kinds of telecommunications facilities. They vary in many ways. The differences between types of facilities can warrant differences in the regulations governing them.

The following subsection describes six kinds of differences among RF facilities and the way regulations could vary as a function of those differences.

Power. The power with which an RF facility transmits affects the potential for health effects from that facility. Low power facilities have little or no potential for effects. Facilities that do not transmit, (i.e., receive only facilities) have no potential for health effects. Therefore the County does not need to regulate their NIER emissions to the same extent it might regulate high power uses.

What is "low power" is a matter of fact and policy. Generally power is expressed in terms of average output power or effective radiated or irradiated power (ERP or EIRP). ERP and EIRP are defined as the power input of the antenna multiplied by the numerical power gain of the antenna relative to the dipole or isotropic radiator, respectively.

There is a consensus that facilities that operate with input power to the radiating element of 7 watts or less are sufficiently low power to be exempt from NIER regulation. This includes many public safety and consumer devices that use RF energy, such as walkie talkies, CB radios, and mobile cellular telephones.

Some authorities exempt facilities transmitting with an input power of 100 watts or less. Most point to point microwave facilities operate with power input to the transmitter of 10 watts or less, and many 2-way radio facilities operate between 60 and 100 watts. (Cite 29, p. 1; Cite 30, p. 5; Cite 31, pp. 22

- 23; Cite 32, p. 1)

Frequency. The frequency of transmissions also affects the potential for health effects, because humans absorb more RF energy in the frequency range of 30 to 300 MHz --- the so-called "resonant frequencies" for humans ---than in other frequencies.

Therefore an NIER standard should be frequency dependent, with progressively higher NIER levels allowed as the frequency of a given facility is lower or higher than the resonant range for humans. (Cite 30, p. 10; Cite 31, p. 18; Cite 32, pp. 5 - 6)

Size. A small facility is not as likely to cause adverse effects as a large facility. Therefore the County could regulate small facilities less than large facilities.

What is a "small" facility is a matter of fact and policy. The size of the site of a facility, the height of antennas, and the height and cross-section of supporting structures are convenient guides to what is small.

If an antenna and supporting structures comply with the height and setback limits that apply to other structures in an area, an RF facility is less likely to cause adverse effects. A larger RF structure could have the same effect as a smaller one if the site on which the RF structure is situated also is large, relative to the size of other parcels in the area, and the RF structure is placed centrally on it.

Location. Location could be relevant to RF facility regulations in at least 3 ways: the location of the RF facility site, and the location of RF devices on that site, and the permanence of a location.

First an RF facility may be more or less problematic in certain zones. A facility in a commercial or industrial zone is less likely to cause adverse visual effects, because the area is (or will be over time) characterized by structures that are like a structure for transmitting antennas. Many effects of an RF facility in such a zone will be less than other uses allowed in the zone, such as traffic and airborne and waterborne wastes.

Also a facility in an agricultural or forest zone is less likely to cause adverse effects, because lot sizes in the area are so large and population density is so low that a facility would be separated from people and uses with which it might conflict.

However an RF facility in a residential zone is more likely to conflict with the visual character of the area, and the proximity of people to the facility make it more problematic.

Therefore the County could regulate RF facilities to discourage them in a residential zone and to deal with their adverse effects when a site in a residential zone must be used. The County would not have to deal with those effects to the same extent in an

industrial, commercial, or non-residential resource zone, and so fewer regulations might apply to an RF facility in those zones. (Cite 30, pp. 1 - 5, 8 - 9; Cite 31, pp. 2, 6, 11 - 13; Cite 32, pp. 2 - 6)

The location of an RF antenna on a site also could affect the NIER regulations that apply to the facility or the burdens imposed by those regulations. To implement NIER regulations, the County could require that an applicant for a new high power RF facility to measure ambient RF energy levels, and to calculate the level projected with the proposed facility. However that process can be expensive and its results can be subject to dispute.

The US Office of Science and Technology (OST) has calculated RF energy levels for a range of distances from many kinds of antennas at given ERP's, assuming worst case conditions.

The County could waive NIER measurement and calculation requirements for a given antenna addressed in an appropriate version of the OST tables if the antenna's center of radiation is separated from publicly accessible space by at least the sitance the table shows is necessary to ensure the antenna complies with the NIER standard adopted by the County. (Cite 30, pp. 7 - 8; Cite 31, pp. 21 - 22; Cite 32, pp. 6 - 7)

Lastly a land use that has no fixed location generally is

exempt from land use laws. For this reason, the County could exempt RF facilities that are portable, handheld, or situated in vehicles, and goods in shipment or on display. (Cite 30, pp. 5 - 6; Cite 31, pp. 1, 23; Cite 32, pp. 1 - 7)

Existing or new facility. Most land use laws do not apply to uses that legally exist when the law is adopted. A legally existing use that is prohibited or restricted by a law adopted after the use is vested is called a non-conforming use. Such uses often are allowed to operate and be maintained without complying with the new law. However if a non-conforming use changes, then it commonly must comply with laws adopted since it was built.

Generally only a new law that is intended to prevent a clear hazard to the public applies to new uses and to unchanged existing uses. The County could distinguish the way it regulates existing and new RF facilities based on the intent of the new law.

For instance it could require all facilities, existing or new, to comply with NIER standards if the County finds NIER from existing and new NIER sources is a hazard to the public. An RF facility legally built before the County adopts a new RF facility siting law would be exempt from other provisions of the new law until the facility is changed.

Also the County could promote changes in existing non-conforming facilities if the change reduces NIER levels or adverse visual or other effects even though the changed facility does not comply with all other requirements for a new facility. (Cite 30, p. 12; Cite 31, pp. 5, 8, 19, 24)

Applicant and purpose. The differences between applicants and purposes for an RF facility may warrant different treatment.

For instance, a facility that is accessory to a permitted use on the same site generally is not regulated as strictly as a stand-alone facility. This is common because an RF facility as an accessory use will tend to be compatible with the primary use and other uses in the area, particularly if the accessory use complies with dimensional and other standards that apply to the primary use.

As an example, ham and citizens band radio facilities generally are exempted from stringent RF regulations, even though they commonly are in residential zones, because they are accessory to a residential use. Also many hundreds of FCC licenses are issued for such uses in the area each year. The administrative burden that would result from regulation of such uses is not warranted by the potential adverse effects of those uses.

Also some land uses include facilities that use RF energy for production or treatment processes, rather than for transmitting

or receiving telecommunications data. Medical and scientific research equipment are examples of such non-telecommunications facilities that use RF energy. These land uses generally are exempt from RF facility regulations, because of this difference in their purpose. (Cite 30, pp. 1, 5 - 6; Cite 31, p. 1; Cite 32, p. 1)

Also a facility that is needed to protect the public safety or is part of a national or local defense, power, or communications system could be so important that it is exempt from or subject to less stringent standards than other kinds of RF facilities. King County has given such preferred treatment to utilities.

However often it is difficult to tell just when an RF facility is a utility. Most RF facilities serve some public purpose as well as a private or commercial one. Therefore the distinction between a utility and other RF uses may be hard to apply. Jurisdictions that have made such distinctions have limited preferred treatment to defense and radar installations. (Cite 30, p. 5)

TYPES OF CRITERIA

Approval criteria for an RF facility can be either discretionary or non-discretionary or some mix of the two.

To decide whether a proposed RF facility complies with discretionary criteria, subjective judgment must be used.

Reasonable people can dispute whether a given facility complies with such a standard.

Discretionary standards generally are applied in a public hearing at which differing opinions and evidence about such a dispute can be introduced. Generally an administrative decision regarding a discretionary standard can be appealed to the governing body.

To decide whether a proposed RF facility complies with non-discretionary criteria, objective judgment is used. Reasonable people cannot dispute whether a given facility complies with such a criterion. Such standards can be applied administratively, without substantial public review or appeal rights.

In some cases a mix of discretionary and non-discretionary criteria may be appropriate. For instance, an approval standard could be stated in discretionary terms, and one of the ways to conclusively comply with that standard could be stated in non-discretionary terms.

As an example, the County could require an RF facility site to be large enough to protect the public from harm due to collapse of the tower structure (discretionary). The ordinance could provide that a site complies with that discretionary standard if the tower base is setback from adjoining property lines by a

distance equal to at least 20% of the height of tower (non-discretionary). This mixed-criteria approach can provide flexibility as well as certainty.

TYPES OF APPROVAL PROCEDURES

There are at least 3 kinds of approval procedures. A ministerial process is the least involved. Such a process is appropriate if the decision is one that is mandated by the law. No discretion is involved. It does not involve a hearing. No notice of the decision is given, and there is no right to appeal such a decision. This is the process commonly employed to grant a permit for a land use that is allowed outright in a given zone.

An administrative process is somewhat more involved. Commonly an administrative decision is made by staff based on non-discretionary standards and clear and objective data. Generally such a decision does not require a public hearing and cannot be appealed, although sometimes notice of the decision is given to the public, and there may be a right to request a hearing to review the basis of the decision. This is the process that is used commonly for a facility that is allowed subject to prescribed conditions in a given zone.

A quasi-judicial process is the most involved. It may use discretionary and non-discretionary standards. A quasi-judicial

decision is preceeded by a hearing, and is subject to appeal. This is the process that is used commonly for a conditional use permit or for a small tract zone change.

A decision approving an RF facility in either an administrative or quasi-judicial context may be made subject to conditions that require later administrative review of detailed plans, mitigating measures, and monitoring requirements.

SUBJECT MATTER

Throughout this project, 13 subjects have been considered. They are listed on the left hand edge of the table below. Each of the ordinances in Cites 30 - 32 address most of these subjects. The table below lists the pages on which the corresponding subject is addressed by the cited ordinance.

TABLE 7 - SUBJECT MATTER ADDRESSED BY SAMPLE ORDINANCES

SUBJECT	CITE 30	CITE 31	CITE 32
Health effects	7-8, 9-12	13, 16-23	2, 5-7
Aesthetics	6, 8-9	5-10, 16	2-4
Structural safety		3-6	2-3
RF interference			
Public access	6	5-6	2-3
Ice fall		5-6	2
Noise	6		
Property value			
Sanitation and water			
Natural resource effects		10	3
Open space			
Traffic and parking	9	10	3
Land consumption	8	2-5	1-4

SEPA REVIEW

Land use regulations in Washington must comply with the State Environmental Policy Act (SEPA). A given land use can be categorically exempt from further environmental review under SEPA, or it can be subject to SEPA. Categorical exemptions are created by the Department of Ecology. Most RF facilities are not categorically exempt from SEPA, although the County could apply to DOE to have certain RF facilities made so.

If a proposed land use is subject to SEPA, an environmental assessment (EA) commonly is prepared first. If that EA shows the use will not cause significant adverse effects, a determination of non-significance (DNS) is issued, and no further environmental review is required under SEPA.

If the EA shows adverse effects could occur, but those effects will not occur if the proposed use complies with certain conditions of approval, a mitigated DNS is issued, and no further environmental review is required under SEPA as long as the use complies with the conditions of approval included in the mitigated DNS.

If the EA shows a given proposed use could cause significant adverse effects, or if the parties agree such effects could occur even without doing an EA, a determination of significance (DS) is issued. In that event an environmental impact statement (EIS)

must be prepared for the facility.

The County could adopt rules about SEPA procedures for RF facilities. Such rules could describe when a DNS, mitigated DNS, or DS should be issued, and what an EIS for a facility should contain. Distinctions could be based on location, power, size, existing or projected NIER levels, and other features of a facility.

COST

The County can require a fee to process an application for an RF facility. That fee should correspond to the actual cost to process the permit, including staff labor, supplies, notices, the cost for hearings if any, and the cost for expert witnesses who might be hired by the County to verify NIER calculations or measurements.

If a facility is approved, the County could require the permitee to pay a fee to finance monitoring of that facility. No other jurisdiction has required operators to pay a fee for monitoring, although it was considered in Portland, Multnomah County, and elsewhere.

A fee to pay for monitoring an isolated RF facility could be determined reliably. However it would be hard to equitably assess an operator for monitoring where more than one RF facility transmits at the same time, because one operator may end up

paying for an adverse effect (i.e., NIER) that his or her facility does not cause in significant amounts.

Also it should not be necessary to monitor NIER levels over time, because NIER levels caused by given RF devices do not change significantly once established. See also the discussion in the next section.

MONITORING AND ENFORCEMENT

The County should ensure RF facilities comply with NIER limits and conditions of approval.

Conditions of approval generally can be checked during site plan review and during construction. The County could refuse to issue an occupancy permit or to conduct a final inspection of a facility that did not comply with a condition of approval. A performance or penalty bond could be required to assure compliance.

NIER limits could be more difficult to monitor and enforce, because it can be costly and requires more expertise. No local government has adopted rules for monitoring and enforcing NIER standards.

The County could assign responsibility for NIER monitoring to the Health Department, provided funds and staff were made available for that purpose. Or the County could contract with

local engineers or scientists in the private sector or in such public institutions as the University of Washington to take NIER measurements when needed. Or the County could have the industry or an industry-associated institution monitor NIER levels, with periodic reports to the County.

Since NIER is calculated or measured as part of the FCC license application, renewal, and change processes, NIER information can be provided to the County at little added cost to the industry.

There may be little need for monitoring of NIER levels, because NIER levels do not change unless a facility is created or changed, and facilities cannot be created or changed without complying with County ordinances. However periodic NIER merements at VHF broadcast facilities could be made inexpensively with a broadband instrument to ensure compliance with County NIER standards.

If the County adopts an NIER standard in its zoning ordinance, it is likely to require measurement of ambient NIER levels before most new RF facilities are allowed, calculation of expected NIER levels if approved, and measurement of NIER after construction of a new facility. In light of these requirements, a facility operated in good faith will not cause ambient NIER levels to exceed the standard, and enforcement should not be needed.

However members of the public may become concerned about NIER

levels nevertheless , and the County should have the ability to respond to those concerns. Sometimes the only adequate response will be to measure ambient NIER levels in a given area.

If the concerns are reasonable in light of what is known about NIER levels in the area for which the concern is raised, the County or the owner of the subject facility(ies) or some combination of the two could pay for the measurements. If the concerns are not reasonable, the concerned public could be required to pay for or contribute to the cost of such measurements.

In the event NIER levels in a given area exceed the standard, the County should enforce the standard. The County could suspend or revoke the permit for a facility that violates the standard and attempt to terminate the facility by filing appropriate actions in court or before the Federal Communications Commission.

If more than one facility could cause the NIER that exceeds the standard, matters are more complex. The County then has at least 7 ways (and combinations thereof) to allocate responsibility for the violation.

- It could inform the FCC of the violation, and attempt to talk them into forcing compliance (deferral).

- It could inform the owners of the responsible facilities, and provide a framework for jointly reducing NIER levels

below the standard (joint responsibility).

- It could require the last facility approved to terminate or change operations until NIER levels are below the standard (last in-first out).

- It could require all facilities to reduce power or NIER emissions an equal amount, so the NIER level from the aggregate of all facilities is below the standard (equal absolute reduction).

- It could require all facilities to reduce power or NIER emissions an equal percentage in proportion to their NIER emissions, so the NIER level from the aggregate of all facilities is below the standard (equal percentage reduction).

- It could require the owners of each facility to spend an equal amount to reduce their facility's NIER emissions so the aggregate NIER level is below the standard (equal reduction expense).

- It could require each owner to spend the same dollar amount per unit of emission reduction (equally cost-effective reduction). (Cite 39)

PART IV

ALTERNATIVE REGULATORY SCHEMES AND COMMON FEATURES

ALTERNATIVE REGULATORY SCHEMES

Organization and purpose. This section of the report begins by describing 2 overall approaches the County could take to regulate siting RF facilities: a traditional zoning approach and a special purpose RF facility overlay district approach.

The same format is used to describe each overall approach. First is a summary that explains main features of the approach, how it is used, and what it costs to administer. Next is a set of policies and implementing actions for the summarized approach. These are followed by a description of the implications of that approach, such as what disputes could arise using the approach, how various interest groups could respond, and how well it is likely to work.

Table 10, at the conclusion of the discussion about both approaches, compares and contrasts their main features.

After Table 10 is a description of regulatory features that would be common to both approaches. Included are: (1) definitions of terms, (2) NIER standards, (3) design standards,

and (4) non-conforming use standards.

The format is the same for each "common" feature. First the purpose of the feature is explained. Then policies and implementing actions or sample text for that feature are given. Table 12, after the discussion, summarizes the common features.

TRADITIONAL ZONING SCHEME

Summary. Using this approach, the County would decide in what existing zones to allow each type of transmission facility and under what conditions.[2] It would classify each kind of transmission facility as a permitted use,[3] a use permitted under prescribed conditions,[4] a conditional use,[5] or a prohibited use in each zone. RF facilities would be considered on a case-by-case basis.

All types of RF facilities could be regulated using this approach. Also such an approach can address all the potential effects of and concerns about a given RF facility.

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2. The words "zone" or "underlying zone" are used in this report to mean an area accurately defined as to boundaries and location on an official map and within which area only certain types of land use are permitted, and within which other types of land uses are excluded. This is similar to KCC 21.04.338.

3. A "permitted use" is one classified as such in a given zone and is allowed after not more than a ministerial review by County staff, such as for a building permit. This is similar to primary permitted and accessory uses in the King County Code.

4. A "use permitted subject to prescribed conditions" is one classified as such in a given zone and is allowed after staff find it complies with non-discretionary approval standards, subject to notice and appeal rights. This is similar to an administrative conditional use in the King County Code.

5. A "conditional use" is one classified as such in a given zone and is allowed after public notice and hearing if it complies with discretionary and non-discretionary approval standards, subject to conditions of approval and appeal. This is similar to KCC 21.04.088.

The classification of each kind of RF facilities using this approach depends on the significance of and potential for adverse effects of each kind of facility in relation to other uses allowed in a given zone and the objectivity with which approval standards and conditions of approval can be defined. This is similar to the concept in KCC 21.04.078.

The following describes how certain variables, described in the preceeding part of this report, affect the classification of certain RF facilities in typical zones.

Classification based on NIER emissions. The most often cited concern about RF facilities is with their NIER emissions.

Some future RF facilities will operate at low power levels or will be situated so that NIER emissions are not problematic, and they do not cause other adverse effects. These facilities could be permitted outright.

Other future RF facilities will emit higher levels of RF energy because of their higher ERP or EIRP.

If such an RF facility is proposed in or next to a zone where NIER is problematic to the general public, it could be classified as a use under prescribed conditions or conditional use, depending on the quality of the proof needed to show it would not cause ambient NIER levels to exceed County standards or some portion thereof.

If such a showing can be made objectively, the facility could be a use subject to prescribed conditions, subject to mitigating measures for other potential effects.

If such a showing cannot be made objectively, or perhaps, if the result of allowing the use would be to exceed some large percentage of the County NIER standard in the frequency range being transmitted, the facility would be classified as a conditional use.

Classification based on other effects. Regardless of their RF energy emissions, some future RF facilities may be proposed where they could cause an adverse effect. Such effects and the discretion needed to deal with them also will affect the classification of RF facilities.

Some kinds of RF facilities do not cause adverse effects in a given zone, considering other uses allowed in that zone. These RF facilities could be a permitted use in that zone.

Other kinds of RF facilities in a given zone can cause adverse effects. Many of these effects can be prevented or mitigated.

If it can be shown objectively that the potential adverse effects of a given kind of RF facility can be prevented or mitigated to the extent provided by Code, that kind of facility could be classified as a use permitted subject to standards in

that zone.

For a use under prescribed conditions, County staff could decide, after public notice and a right to comment, if a facility complies with non-discretionary approval standards in the Code. Discretionary standards could be applied to design details of such a use, but not to the decision whether the use should be permitted at a given site.

If such a facility is treated like the County Code now describes an administrative conditional use, the staff decision could be appealed to the zoning adjuster. However if the approval standards are objective, there is little practical purpose for an appeal, except to dispute the completeness of an application or the accuracy of its contents.

An application for such a facility should include or be preceeded by an environmental assessment from which a determination of nonsignificance or mitigated determination of nonsignificance results.

Other kinds of RF facilities in a given zone could have potential adverse effects that are not easily identified or mitigated, so that non-discretionary approval standards are not adequate to address them. Such a facility could be a conditional use.

A request for an RF facility as a conditional use could be

subject to discretionary as well as non-discretionary standards. Discretionary standards use goal- and performance-oriented language instead of specifying exact ways and means to accomplish a public purpose. Commonly such standards involve subjective judgment about whether a facility achieve broad concepts, such as "public interest", "general welfare", or the "most" or "least" "possible" or "practicable" effect or mitigation.

Judgments about discretionary standards often depend on perceptions and values. Reasonable people can disagree about whether a given facility complies with such standards. Values cannot be integrated easily in an objective way into the County Code in advance of the application for a given facility.

A conditional use permit can be granted using a quasi-judicial approval process that requires or allows a public hearing as a matter of right. A decision resulting from such a process could be appealed, because each decision necessarily involves choices of policy for which the governing body is responsible ultimately.

An application for an RF facility as a conditional use should include or be preceded by an environmental assessment, appropriate determination under SEPA, and, if needed, an environmental impact statement. However just because a given RF facility is a conditional use does not mean it also must receive a determination of significance and vice-versa.

Cost. The cost of the traditional zoning approach varies depending on the type of use.

A permitted use would cost relatively little to process compared to other kinds of uses. County staff may be able to review such a facility within days after a permit request is filed, if the request is complete and proper.

The County could provide an application form that elicits the information needed to show a given facility complies with each objective approval standard. The goal would be for such an applicant to need no more information than required for a building or land use permit and FCC license. If there is no appeal from this process, except for an applicant, as is the case for other permitted and accessory uses in King County, appeal costs will not be incurred.

A use permitted subject to prescribed conditions would be somewhat more expensive to process than a permitted use. Somewhat more information may be required, taking time for the applicant to prepare and for the staff to review. The staff may have to inspect the site of the proposed facility or verify information in the application. The staff also may have to prepare a written decision showing how the facts of each application comply with the applicable law.

If a use permitted subject to prescribed conditions is treated

like an administrative conditional use, the County will provide public notice and an opportunity to comment about an application before making a final decision. This cost can be passed on to the applicant through fees.

A staff decision about an RF facility as a use permitted subject to prescribed conditions need not be subject to appeal except by the applicant if:

- The staff do not apply discretion when reviewing a request for a given facility, or
- Discretionary judgments are made only about technical details of a facility, but not about whether it should be allowed.

If no appeal is allowed, appeal costs are avoided. However the County Code allows appeals of staff decisions about many matters, including administrative conditional uses.

A conditional use could be relatively expensive to process, as it is now. Public notice and a hearing are required. Discretionary standards are likely to apply in part. Reasonable people can disagree about the meaning of discretionary terms and about what must be shown to comply with such terms. It is often more expensive to provide information to address discretionary standards than to address non-discretionary, objective ones.

Also it is more likely that time and effort will be spent to design and dispute the adequacy of mitigating measures for a conditional use RF facility.

Appeal of a conditional use permit is more likely, because such a use typically is more complex than other kinds of uses, is subject to discretionary standards, and requires more complex and discretionary conditions of approval. If an appeal occurs, it can increase greatly the amount of time and money spent by all parties.

Enforcement. An RF facility approved using any process could be reviewed by a County inspector as part of the building code inspection program to verify it is installed as represented by an applicant and as required by any conditions of approval. However if NIER levels must be measured after a new RF facility is built, the building inspectors are not trained or equipped to do so. It is the likely the applicant would pay for such measurements. See the description of enforcement features later in this section.

New data or changed conditions could warrant re-application for or review of a prior decision about any kind of RF facility.

TABLE 8

SUMMARY OF POLICIES AND IMPLEMENTING ACTIONS

FOR TRADITIONAL ZONING SCHEME

Policies	Implementing actions
Policy A. Allow a class I RF facility as a permitted or accessory use in all zones. (See the "definitions" part in the common features section later in this report for a definition of class I and class II RF facilities. Class I RF facilities do not cause adverse effects or health concerns or are not land uses in the traditional sense. Class II facilities include everything else.)	To implement policy A. Amend the regulations for all zones to allow a class I RF facility as a permitted or accessory use.
Policy B. Allow a class II RF facility as a permitted use in zones in which it is like other permitted uses, (i.e., industrial and land extensive commercial zones), or in zones where it is buffered by large areas of undeveloped land with low population density, (i.e., non-residential forest and agriculture zones).	To implement policy B. Amend the regulations for the most commercial, industrial, forest, and agriculture zones to allow certain class II RF facilities as a permitted or accessory use in those zones.
Policy C. Allow a class II RF facility as a use permitted subject to prescribed conditions in zones where it is compatible with other uses if it complies with standards and conditions that are non-discretionary primarily. This treatment may be suited for some RF facilities in land intensive commercial zones, where land consumption is important and many people work or live nearby. Also it may appropriate in rural zones if the proposed facility is not a permitted or accessory use.	To implement policy C. Amend the regulations of the remaining commercial and rural zones to allow a class II RF facility as a use permitted subject to prescribed conditions. Adopt the prescribed conditions under which a facility is allowed in those zones. Prescribed conditions might include a large minimum site size, larger than otherwise-required setbacks for structures, landscaping standards, limits on non-essential uses, measures to prevent and deal with RF interference that occurs, and design standards for color, materials, lighting, and scale.

TABLE 8 (continued)

Policies	Implementing actions
Policy D. Allow a class II RF facility as a conditional use in a zone where a facility could have adverse effects that cannot be assessed or prevented with primarily non-discretionary standards or conditions. A facility in a low density residential or mixed use zone is most likely to be subject to this treatment.	To implement policy D. Amend the regulations of low density urban residential or low intensity mixed use zones to allow a class II RF facility as a conditional use. Adopt standards for such a conditional use consistent with SEPA. Approval standards could require an applicant to show the facility could not be situated in another zone where it would be allowed as a primary use or use under prescribed conditions or on an existing facility site or structure. Guidelines for such a showing should be provided. Adopt conditions of approval for such facilities. Conditions might require an applicant to comply with more stringent site size, setback, design, and landscaping standards than required generally. Also they might prohibit non-essential uses and require mitigation of subsequent RF interference.
Policy E. Prohibit a class II RF facility in a zone where its potential adverse effects cannot be reduced enough to make it compatible with permitted uses. Such effects might occur include the consumption of land for which there is a short supply and significant need, such as zone reserved for high density housing in growth areas; destruction or substantial dimunition of significant cultural, visual or historical features; or an airport landing field, or where planned improvements could conflict with aircraft and conttrollers. A facility in a high density urban residential zone or airport landing field zone or a facility in an area in which RF energy levels already approach an NIER standard is most likely to be subject to this prohibition.	To implement policy E. Amend the regulations of high density urban residential zones, airport land field zones, and intense mixed use zones to prohibit a class II RF facility.

Implications of traditional zoning approach.

This approach is relatively simple to implement. For the most part, it uses existing zones and regulations, and existing land development review procedures.

Existing regulations would be amended to include more detailed, explicit provisions for RF facilities. Also new procedures would be needed if only an applicant can appeal of administrative decisions regarding an RF facility as a use permited subject to prescribed conditions.

The most controversial element of this approach concerns in which zones to allow class II RF facilities and in which zones to prohibit them.

Most of the industry will want to be able to put facilities in as many zones as possible. The industry will prefer standards that are non-discretionary and review procedures that cannot be appealed by the general public.

Most of the the public will want to prohibit facilities in residential zones, and will want broad approval standards and public appeal rights.

The more restrictive the County regulation, the fewer available RF facility sites there will be, and the more likely an applicant will want to put a facility where it is not allowed. If an

applicant cannot find a suitable site where a facility is allowed, the applicant could sue or request FCC intervention.

If an applicant has a choice between 2 otherwise equal sites for a proposed facility, and zoning regulations allow the facility outright or subject to ministerial review in one zone but only as a conditional use in the other zone, the applicant will be motivated to use the site in the zone where the facility is allowed outright or after ministerial review. The applicant can be more certain of the result of his or her request and of the time it will take to process the request.

Therefore if there RF facilities outside residential zones, and they are good sites from industry engineering and marketing standpoints, those sites will be used first, because they can be developed more easily. However if the majority of good sites are in residential zones, the traditional approach will result in many conditional use hearings, disputes about whether a given facility complies with broad discretionary standards, and disputes about federal supremacy.

The success of the traditional approach depends largely on whether approval standards are clear and complete, and on whether there is an adequate supply of good sites where RF facilities are permitted outright or subject to prescribed conditions.

If standards are vague or incomplete, or if there are not

enough good sites outside residential areas, protracted hearings and disputes may result. The potential for this result may be reduced if the telecommunications industry and the interested public work together to design standards and to decide in which zones to allow RF facilities, and if the County provides a forum for on-going review of the consequences of its RF facility regulations.

RF DISTRICT SCHEME

Summary. Using this approach, the County would identify and specially regulate areas where certain kinds of RF facilities should be sited, considering all the public and private interests involved. Within those areas, RF facilities would be a permitted use or a use under prescribed conditions. The result is an RF facility overlay district.[6]

Other land uses in the district that might conflict with RF facilities --- such as residences --- could be regulated, so the potential for future conflicts is reduced through siting, building, and other standards that allow both uses so each is least likely to affect the other.

A major goal of this approach is to promote clustering of RF facilities. By saying where such clusters are best suited and making it relatively easy to site a facility there, the County provides an incentive to put facilities there.

However, for this approach to work, the RF facility district must be applied to large enough areas for facility clusters and to areas suited for all kinds of RF facilities. If the district

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6. The words "district" or overlay district are used in this report to mean an area accurately defined as to boundaries and location on an official map, subject to adjustments, and within which area the rules for uses in the underlying zone apply only if they are consistent with the rules of the district.

is not applied to areas where RF facilities are suited, its incentives will not be enough to prevent requests for facilities outside the district or for expansion of the district.

Implementation. Such an approach could be implemented in the community plans for each area of the County, or in a functional plan for the whole County.

The zoning maps to apply an RF plan to areas specified in such a plan or plans could be prepared and adopted in the process of drafting and adopting the plan(s).

This report does not identify specific areas to which the overlay district should apply. Guidelines for such areas are described. More detailed study of potential sites is needed before the overlay district could be applied with reliable results.

It will take County staff and the interested members of the public many hours over many months to prepare an RF element for a community or functional plan. Close coordination with affected communities and industry representatives will be needed throughout.

One goal of this approach is to achieve consensus about where to put RF facilities and to protect those areas for specific kinds of facilities, subject to specific mitigating, compensating, or otherwise dependent actions. Complex

multi-party negotiations will be needed to reach a consensus, particularly if an area to which the district is applied contains more than one ownership, as is likely.

The regulation would be pro-active. The County would apply the overlay zone to suitable areas before anyone applies for a new RF facility in those areas (or a major change to an existing RF facility in a given area). In response, more RF facilities should locate in one of the district areas.

Also a property owner could request a zone change to apply the overlay district to or to remove the district from his or her property. If the district is established with a functional plan, such a zone change also may require a plan amendment. Or, the plan could provide guidelines for applying the overlay district without needing a plan amendment too.

For instance the plan could allow, without a plan amendment, expansion or reduction of an RF overlay district by a given amount (percentage of area or absolute area). Also it could identify where other areas are that may or may not be suitable for the overlay district, and allow use of the district there without amending the plan. Lastly it could require a new RF facility district area to comply with the policies listed in this report or the like.

This approach promotes clustering RF facilities. The County

could apply the overlay to existing RF facility sites with excess land or structural capacity to promote that clustering. However if the County applies the overlay district to all such existing sites, it may conflict with existing residential or otherwise sensitive uses.

Before applying the district to areas zoned or developed for residential uses, County officials must balance competing interests. There are at least 4 ways to balance those interests.

- They could decide what balance is appropriate for each area, based on policies developed in the planning process.

- They could decide to apply the district regardless of residential zoning or development of the area, striking the balance in favor of telecommunications over residential land use.

- They could decide that the district would not apply to existing RF facility sites that are in areas where the underlying zoning is residential, striking a balance in favor of residential land use over telecommunications.

- Or they could could decide not to apply the district to an area zoned residential only if certain other conditions exist, such as if there are residences built within some distance of the facility or if the area has a minimum

density of developed units.

The decision about where to apply the district will be hard. Every area to which the district is applied should be found to be useful to the industry that is expected to use them.

It is inevitable that more conflict will result from applying the district to an area where there is residential development. Therefore to reduce that conflict, the County should not apply the district to areas where residential development exists and is planned, to the extent practicable.

Whether applied to residential or non-residential areas, each area to which the district is applied should be large enough to meet industry needs and to buffer the site from potentially conflicting uses. Substantial visual buffers, such as a forest, may substitute for substantial distance buffers.

If the district does not apply to areas where there are now RF facilities, facilities in excluded areas will become non-conforming uses. Rules will be needed to deal with changes to non-conforming RF facilities.

The County Code does not allow expansion of non-conforming uses in many cases. However RF facilities are likely to need to change over time. At least some of those changes could reduce existing adverse effects caused by those facilities. See the last topic in the "Common Features" section of this report for a

discussion of non-conforming uses.

RF facilities may be proposed outside of the RF district, even if the County does a good job of applying the overlay district where it is needed generally. A traditional zoning approach could be used to deal with facilities outside the overlay district.

- A given kind of RF facility could be permitted outright or subject to prescribed conditions if it operates at low power or is situated so NIER emissions are not problematic and will not cause other adverse effects.

- A given kind of RF facility could be a conditional use if it operates at high power, or it could cause adverse effects.

There is a disincentive to apply for a conditional use permit; that is, to site a major RF facility outside the RF district. See the discussion of conditional uses in the preceeding section of this report.

It will be much easier to site a major RF facility in the RF facility district, where they are permitted or permitted subject to prescribed conditions. Therefore they are more likely to be proposed there ---- if the district is suited for the facility from an engineering and marketing standpoint.

The RF district scheme could lead to somewhat more rapid SEPA

review if the County prepares a non-project environmental impact statement (EIS) for the district. The non-project EIS seldom will suffice for a proposed RF facility on a given site. But the EIS would provide guidelines for environmental analysis and EIS scoping for future facilities. A supplement or addendum to the non-project EIS may be all that is needed for a given RF project in the district.

Cost. The total cost of the RF district scheme probably is higher than the cost of the traditional zoning approach, although costs are spread differently.

To use the district approach, the County and the interested public and industry must expend considerable time and resources drafting the RF facility plan(s) and and applying the overlay district to each site, unlike the traditional zoning approach. Then it must expend more time and resources to consider each application for a facility on a case-by-case basis, as it would under the traditional zoning approach.

Case-by-case review of proposed RF facilities in an overlay district usually would be easier than case-by-case review of the same facility under the traditional zoning approach, because an RF facility would be allowed in the district subject only to non-discretionary standards.

Non-discretionary standards are easier to address and resolve

than discretionary standards. Decisions based on non-discretionary standards are less likely to be appealed. This makes case-by-case review less costly to all parties.

Case-by-case review of an application for a given kind of RF facility outside the overlay district will cost about the same using the district approach as the traditional zoning approach. The cost would depend on whether it is permitted outright, subject to prescribed conditions, or as a conditional use. See the cost discussion in the section of this report about the traditional zoning approach.

TABLE 9

SUMMARY OF POLICIES AND IMPLEMENTING ACTIONS

FOR RF DISTRICT SCHEME

Policies	Implementing actions
Policy A. Create an RF facility overlay district that contains rules for RF facilities and for other uses in the district. The district rules shall supercede contrary rules applicable to the underlying zone. Allow a class I RF facility in that district as a permitted use. Allow a class II RF facility in that district as a use subject to prescribed conditions. Prohibit or restrict uses that conflict with RF facilities.	To implement policy A. Amend the zoning code to include the RF facility overlay district. Describe permitted and prohibited uses in the district. All class I uses should be permitted outright, and class II uses should be permitted subject to standards. Residences and other uses sensitive to the effects of RF facilities should be allowed subject to standards that reduce the potential for conflict between such uses and RF facilities.
Policy B. Apply the RF facility district to the areas that include existing clusters of RF facilities, subject to total or partial exclusion of clusters in residential zones; and to areas suited for future clusters or specific RF uses; and to a buffer area around existing and projected future uses at those sites. Each area to which the overlay district is applied should be large enough and/or contain topographic or other physical features so that NIER levels outside the district are much lower than the county NIER standard; so that the area outside the district is protected against effects due to tower failure or ice fall; and so that significant visual buffers or landscaping can be provided around and within the area. Each area should work for some segment of the telecommunications industry. People from the industry and the areas affected should help design and apply the district.	Adopt non-discretionary standards for class II RF uses and other uses that are restricted. Provide standards for RF structure height, site size, landscaping, noise, water use, parking, lighting, color and materials. Adopt conditions of approval for RF facilities and other uses that are restricted in the district. RF uses could be approved subject to conditions that require leasing available space on a tower or site. Other conditions could require noise-producing or visually obtrusive features to be below grade or within structures, use of compatible colors and materials, underground power, retention of existing vegetation, and consolidation of structures. They could prohibit lights (unless required by the FAA), advertising signs, and non-essential features.

TABLE 9 (continued)

Policies	Implementing actions
Policy C. Allow a class I RF facility as a permitted or accessory use in all zones.	Potentially conflicting uses that might be proposed in the district, such as residences, could be allowed subject to standards that require materials that absorb or reflect RF energy, site plan review to orient the use away from RF facilities, landscaping to obstruct views of RF facilities, and waivers of rights to object to an RF facility that complies with County standards.
Policy D. Allow a class II RF facility outside of the RF facility district as a use permitted subject to standards if is it accessory to a permitted use, or similarly insignificant, based on standards and prescribed conditions. Allow other class II RF facilities outside of the RF facility district as a conditional use only when there is no suitable alternative site for the proposed device(s) in the overlay district, and subject to discretionary and non-discretionary review standards.	To implement policy B. Decide where the RF facility district should apply to residential areas. Decide where the RF facility district should apply to non-residential areas. Amend the zoning maps for King County to show where the RF district will apply. To implement policy C. Amend the regulations for all zones to allow a class I RF facility as a permitted or accessory use. To implement policy D. Amend the regulations for all zones where it is appropriate to allow a class II RF facility as a conditional use. See implementing action for policy D and E of the traditional zoning scheme.

Implications of RF district scheme.

This approach is more complex to implement than the traditional zoning approach, because it requires creation and application of a new district. The district is likely to be implemented with a new or amended plan, which also requires time, money, expertise, and information to prepare.

The County will need help from the industry and RF users to obtain information to prepare and apply the district. Confidential or market-sensitive data may not be available to the County, making it harder to draw conclusions.

If the district is applied to residential areas, residents of those areas are likely to object. If it is not applied to residential areas, the industry is likely to object. Either way, the district will be subject to considerable conflict. The most controversial aspect of this approach is whether to apply the district to residential zones.

However once the district has been applied to a given area, it should be much easier to site a facility in that area, since the approval process would be ministerial or administrative.

Correspondingly, once the district is applied, it will be hard to site a major facility outside the district. Major new facilities will be likely to be sited where the County applies

the district.

Of course, the RF district approach will work only if the County applies the district where RF facilities need to be situated and restricts only major new RF uses outside the district.

If the district does not apply where a given facility must be sited to work, the County standards should not be so strict that a facility cannot be sited outside the district, or else an applicant may seek court or FCC action. It will be hard to draft standards that balance the need to provide for RF facilities and the desire to limit new RF facility sites to given areas.

The RF district could concentrate control of major facility sites and information. For instance it could mean owners of land in the RF district acquire a supply of what could be in great demand, driving up the price of land in the RF district much more than without a district. Also, if a new major RF facility is not allowed outside the district if the RF devices proposed for that facility could be sited in the district, owners of land and existing RF facilities in the district could control information needed for competitors. This could frustrate public and private goals, and should be avoided.

TABLE 10

COMPARISON OF POLICIES FOR THE ALTERNATIVE REGULATORY APPROACHES

TRADITIONAL ZONING APPROACH	RF DISTRICT APPROACH
Allow an RF facility outright if it does not cause adverse effects or is not a land use.	Create an RF facility overlay district that supercedes underlying zones. In that district allow an RF facility outright or subject to ministerial or administrative review. Prohibit or restrict conflicting uses in that district.
Allow an RF facility subject to ministerial review in zones where it is like other uses or where it is buffered by unpopulated, undeveloped land.	Apply the RF facility district to areas where there are existing and projected clusters of RF facilities (subject to total or partial exclusion of residential areas) and to a buffer around those clusters.
Allow an RF facility subject to administrative review and conditions in zones where it could cause adverse effects that can be mitigated using non-discretionary standards.	Allow an RF facility outright or subject to administrative review in any zone where it does not cause adverse effects, is an accessory use, or is not a land use.
Allow an RF facility subject to quasi-judicial review and a public hearing where it could cause adverse effects that can be mitigated using standards that are discretionary and non-discretionary.	Allow an RF facility outside the overlay district if it could cause adverse effects, subject to quasi-judicial review using discretionary and non-discretionary standards.
Prohibit an RF facility where it could cause adverse effects that cannot be mitigated.	

COMMON FEATURES OF BOTH SCHEMES

DEFINITIONS

Special terms for RF facilities should be included in whatever scheme is adopted by the County. The following are terms and suggested definitions for those terms.

1. Class I RF facility: An RF facility that is one of the following:

    1. An accessory use, as defined in KCC 21.04.002, to a use permitted in the zone in which it is proposed;

    2. A receive-only RF facility:

        a. With one or more dishes the sum of the diameters of which are 20 feet or less or with one or more horns the sum of the aperture areas of which is 158 square feet or less, or an equivalent combination of devices, or

        b. That is enclosed within a building permitted in the zone in which proposed or is recessed below grade so it is not visible from off-site.

    3. A portable, hand-held, or vehicular transmitting device;

4. An industrial, experimental, developmental, scientific, medical, or temporary source of NIER operating at frequencies designated for that purpose by the Federal Communications Commission (FCC), such as diathermy, hyperthermic, or X-ray machine;

5. A source of NIER with 7 watts input to the antenna or less;

6. A source of NIER with an average output of 1 kW or less, if used for amateur purposes;

7. Marketed consumer goods, such as a microwave oven, citizens band radio, and remote control toys; and

8. Goods in shipment or storage or on display for sale or demonstration, if operated not more than intermittantly.

2. Class II RF facility: An RF facility that is not a Class I RF facility. A Class II facility is either Class IIA or Class IIB. A Class IIA facility has potential adverse effects that can be assessed and avoided or reduced so it is compatible with permitted uses in the vicinity using primarily non-discretionary approval standards. A Class IIB facility has potential adverse effects that can be assessed and avoided or reduced using discretionary and non-discretionary approval standards.

3. Earth station: An RF facility that transmits to and/or receives signals from an orbiting satellite.

4. Effective radiated or irradiated power (ERP or EIRP): The power input to the antenna multiplied by the numerical power gain of the antenna relative to the dipole or isotropic radiator, respectively.

5. Facility: A structure that supports RF transmitting and/or receiving devices, the devices themselves, accessory uses such as parking and buildings, and the land on which they all are sited.

6. General population: People who are not members of the family or employees of the owner or operator of an RF facility or the owner or users of the site of an RF facility.

7. Hand-held source: A transmitter normally operated while being held in the hands of the user.

8. Height of antenna: The vertical distance between the highest point of an antenna and grade, as defined in KCC 21.04.162, directly below that point.

9. Highest calculated NIER level: The NIER predicted to be highest when all sources of NIER are operating.

10. Intermittant: An RF transmitter that normally operates randomly and for less than 15 consecutive minutes.

11. Interference: Disturbances in reception caused by radiofrequency waves or electric current.

12. Land mobile RF facility: Two-way radio service for mobile and stationary units in which each user is assigned a particular frequency.

13. Microwave: Electromagnetic radiation at frequencies more than 1000 Mhz; highly directional when used for radiofrequency transmissions; uses relatively low power levels compared to other forms of transmission.

14. Non-ionizing electromagnetic radiation (NIER): Electric and magnetic waves emitted by a source of NIER.

15. Portable source: RF facilities that are moved from one site to another and operated at each site for less than 1 month.

16. Power: Energy used in transmitting a signal, measured in watts (W).

17. Radio: A generic term referring to communication of impulses, sounds, and pictures through space by means of an electromagnetic wave, including but not limited to short-wave, FM, AM, land mobile, common carrier, low and

high power television, and microwave transmissions.

18. Radiofrequency (RF) facility: A land use that sends and/or receives telecommunications signals, including antennas, microwave dishes or horns, structures or towers to support receiving and/or transmitting devices, accessory development and structures, and the land on which they all are situated.

19. Receive-only RF facility: An RF facility that only receives signals and does not transmit signals.

20. Shadow: Area within which a radio signal is received poorly or not at all due to manmade or natural obstructions in the line of sight from a transmitter.

21. Source of NIER: An antenna emitting between 100 kHz and 300 GHz with an ERP or EIRP of more than 1 watt.

22. Transmission tower or structure: A structure intended to support a source of RF energy and accessory equipment.

23. Transmitter: Equipment that generates radio signals for transmission via antenna.

24. Vehicular source: A transmitter regularly used in vehicles that normally move about.

NIER REGULATIONS

There is a cause for concern about NIER from some RF facilities, based on the existing consensus about health effects of NIER.

Although there is disagreement among scientists studying the issue, there is a consensus that NIER can cause detectable effects when living tissue is exposed to NIER at a whole body averaged specific absorption rate (SAR) of between 1 and 4 watts/kilogram (W/kg).

Also there is a consensus that NIER effects vary as a function of frequency and time. Frequency is involved because people absorb most NIER in the resonant (30 to 300 MHz) frequencies. Time is involved because RF effects occur only with continuous exposure. Thermal effects of common intermittant exposure levels dissipate without lasting consequences.

The NIER standard recommended in this report is based on the assumption that the threshold of NIER effects is 1 W/kg.

However that threshold is subject to dispute, as discussed at length in the Health Issues background report and at pages 15 and 16 of this report. The dispute is reasonable, because of uncertainties that remain about long term effects of low level NIER exposure.

In the face of such uncertainties, standard-setting agencies and organizations often apply what is called a "safety factor" to such matters as assumptions about thresholds of effects. That is, if an undesireable effect is known to occur if people are exposed to a given amount of something, a standard should allow only a small fraction of that amount to occur.

The amount of the safety factor often varies in proportion to the amount of the unknowns about an effect or its cause. Traditionally a safety factor of at least 10 has been used. For instance, an NIER standard with a safety factor of 10 would allow no more than 1/10 the amount of RF energy known to cause an effect.

ANSI applied a safety factor of 10 when it adopted its 1982 NIER standard. That is, ANSI assumed the threshold of effects is 4 W/kg and its standard allows people to be exposed to no more than .04 W/kg. In contrast Massachusetts, the International Radiation Protection Association (IRPA), and the National Council on Radiation Protection and Measurement (NCRP) applied a safety factor of 50 to the same assumption about the threshold of effects. That is they allow people to be exposed to no more than .08 W/kg (or 1/50 x 4 W/kg). A safety factor of 100 when applied to the same assumption about thresholds would allow people to be exposed to no more than .04 W/kg.

In 1986, the US EPA issued a notice of proposed recommendations

for a federal radiation protection guidance standard. See 51:146 Fed. Reg. 27318 (July 30, 1986) If adopted, a federal guidance standard would apply only to federal agencies.

The notice describes 3 options for an NIER standard: 1000, 200, and 100 uW/cm^2 in the resonant frequencies, depending on assumptions about safety factors. All the standards considered are based on the assumption the threshold of adverse NIER effects is 1 to 4 W/kg depending on differences in individuals and environmental conditions.

The 1000 uW standard results in a safety factor that varies from 1 to 10, depending on threshold assumptions. The 200 uW standard results in a safety factor that varies from 5 to 50, depending on threshold assumptions. The 100 uW standard results in a safety factor that varies from 10 to 100 depending on assumptions.

Assuming NIER effects begin to occur at 1 W/kg, and applying a safety factor of 10, the maximum amount of NIER in the resonant frequencies would be 250 microwatts/square centimeter (uW/cm^2).

As shown on Table 3 at page 17 of this report, several jurisdictions have adopted or are considering an NIER standard of 200 uW/cm^2 in the resonant frequencies. The US Environmental Protection Agency (EPA) also is considering a 200 uW standard. These agencies assumed various thresholds for NIER effects and

applied various safety factors in arriving at a 200 uW standard.

There are advantages to adopting a standard like those adopted or being considered elsewhere, particularly when doing so errs if at all on the side of greater public safety. NIER measurement tools and calculation protocol often are designed in light of common standards. If the County adopts a standard like that used elsewhere, it could be somewhat easier to implement. Also if many jurisdictions adopt the same standard, a de facto national standard may be created even in the absence of federal agency action.

On the other hand, if every jurisdiction has a different standard, an RF user could "forum shop" until he or she finds a jurisdiction with a standard as high as the user needs. If King County adopts a 250 uW standard, it will be more attractive to RF users than jurisdictions with a 200 uW standard.

The consulting team recommends a safety factor of 12.5 apply in establishing an NIER standard for King County. The 12.5 safety factor will make the King County standard 200 uW in the resonant frequencies, like the standard in other jurisdictions that are considering NIER standards.

We believe uncertainties about the threshold for thermal effects and induced currents caused by NIER are being resolved rapidly. A safety factor of 12.5 is enough to prevent reasonable

expectations of public harm based on available evidence.

The evidence about non-thermal effects is not as far advanced. There is no consensus such effects exist or are significant or harmful over time. Also a standard that would prevent exposure to the very low levels of energy that have been projected to cause non-thermal effects would severely reduce the type and power of telecommunications facilities in King County, making it much more likely an RF user and/or the FCC would challenge the standard in court.

Given the uncertainties about non-thermal effects and the substantial public interest in telecommunications, a standard designed to prevent non-thermal effects is likely to be overruled if it has a significant adverse effect on existing and future telecommunications.

Certain RF energy also can cause burns if a person touches an object that conducts RF energy, such as a vehicle, crane, or cable. This effect cannot be prevented using the same NIER standard intended to prevent thermal effects, because burns can occur at much lower power levels than thermal effects do.

RF burns can be prevented by prohibiting an RF facility from causing a current in excess of a given amount. The threshold of RF burns due to finger contact with a metal surface is 200 milliamps (mA). Applying a 12.5 safety factor to that figure, the

maximum permitted current should be 57 mA or, for the sake of convenience, 50 mA.

With this as background, the County should adopt the following policy:

> Adopt a frequency- and time-dependent health standard for ambient RF energy emissions and RF-induced currents from Class I or Class II RF facilities that ensures the general public will not be exposed to more than 1/12.5 of the amount of NIER reasonably expected to cause thermal effects or RF burns. Prohibit a new or existing facility that would cause ambient RF energy levels from that facility and other facilities in the vicinity to exceed the adopted health standard. Encourage RF emissions to be as low as possible.

Such a policy must be reasonable. It should not require the public to absorb more NIER than is reasonably expected to cause an adverse effect. Similarly it should not require an operator to reduce NIER emissions below amounts than it is reasonable to expect them to emit to operate, provided they do not exceed the health standard.

NIER levels allowed by the standard should be verifiable and measureable using tools and expertise available in the region at a reasonable cost. It should not require periodic measurements when existing measurements of NIER are reasonably accurate or when other indicia of NIER emissions are adequate to protect against public harm. County decisions about the validity of a given measurement or calculation should be based on methods and tools recognized in a County ordinance, or incorporated by

reference to standards of an organization with recognized expertise, such as the US EPA, IRPA, or NCRP.

To implement that policy, the County should create an NIER standard with five, frequency-dependent maximum levels. It should list the maximum permitted mean squared electric and magnetic field strengths and their equivalent plane-wave free-space power density as shown in Table 11.

Also it should create a standard for RF-induced burns that prohibits an RF facility from causing a current that exceeds 50 mA at or beyond a property line of the facility to which any member of the general public has legal access.

TABLE 11

RECOMMENDED RF ENERGY STANDARDS

Frequency (MHz)	Mean squared electric field strength	Mean squared magnetic field strength	Equivalent plane-wave power density
.01 to 3	80,000	0.5	20
3 to 30	4,000	0.025	$180/\text{frequency}^2$
30 to 300	800	0.005	0.2
300 to 1500	4,000	0.025	frequency/1500
1500 to 100,000	4,000	0.025	1.0

Electric field strength is expressed in volts squared per meter squared. Magnetic field strength is expressed in amperes squared per meter squared. Power density is expressed in milliwatts per centimeter squared.

If federal or state agencies enact a more stringent general population exposure standard or guideline than that adopted by the County, the County should amend the Zoning Code to adopt the more stringent standard. Accordingly it should allot money and staff time to monitor federal standard setting activities, and the results of research about RF energy effects on human health.

It should require an applicant for a new transmission facility or device to show the facility or device will not cause RF energy levels to exceed the standard. The applicant can show a proposed

use complies with the NIER standard in several ways, depending on the application.

- If a facility is proposed where transmitting devices are not now situated, the proposed facility could be presumed to comply with the RF energy standard if it is situated on a site that is large enough so the base of the transmitting device is setback from property lines a distance at least equal to the distance provided in the tables modified from OST 65 (Cite 15) or engineering practices accepted by such recognized authorities as the US EPA, IRPA, NCRP.

- If a facility is proposed in the vicinity of other transmitting devices, so that the energy from more than 1 device contributes to ambient RF energy levels, require an applicant to measure existing ambient RF energy levels and to calculate anticipated total RF energy levels at specific points at the edge of the RF facility site or off-site.

    * Calculations generally are made continuously at 1 foot intervals to such distances that power densities are an order of magnitude less than the proposed standard and do not exhibit further significant increases at greater distances. All points of reasonable interest are included in such calculations, and can be referenced.

    * The points at which such calculations and measurements

The County should provide protocol for measurements and calculations. The protocol should be based on a spatially-averaged approach and on OST Bulletin 65 (Cite 15) and other commonly accepted engineering practices recognized by the US EPA, IRPA, NCRP, or equivalent. Measurements and calculations should be accompanied by an explanation of the techniques used.

Also the County should prescribe how a violation of NIER standards will be detected, and how it will be abated in the event a violation is detected. See Cite 39 for details.

The general public is likely to be a major source of concerns about NIER violations. County procedures should provide clearly for public involvement in the detection process and, to the extent appropriate, in the abatement process.

If a violation is detected and is not abated in a timely manner, it is likely the County will schedule a public hearing to consider revoking the permits for the facilities contributing to the violation. Public notice and an opportunity to participate should be provided through such a hearing process.

DESIGN POLICIES AND STANDARDS

Many potential adverse effects of an RF facility can be reduced or avoided by requiring a facility to comply with design standards and policies about those effects.

Design standards can be a mix of discretionary and non-discretionary provisions, but non-discretionary standards should be used whenever possible to speed decision-making and reduce the potential for dispute. Also non-discretionary means of complying with discretionary standards should be provided whenever possible.

Some design standards can be applied before approval of a facility. Others can be applied only during site plan review or after a facility is built and operating.

The following design policies and implementing actions are recommended as the basis for such standards.

> Policy A. Require structures associated with a proposed RF facility and a facility site to be no larger than the size needed to achieve the purposes of the facility.

This policy is intended to reduce the effects of a facility relating to structure and site size. By minimizing the size of a site and its structures, the geographic area within which effects

occur should be smaller, resulting in fewer potential land use conflicts due to visual, aural, and economic effects.

This is a discretionary standard. The County could make it non-discretionary by providing that structures for a given kind of facility cannot exceed a certain height and floor area and that the site for a given kind of facility cannot exceed a given area.

To implement this policy include a provision to this effect in standards for an RF facility as a conditional use, if retained in discretionary form, and/or in standards for an RF facility as a use permitted subject to prescribed conditions if used in a non-discretionary form.

With regard to site size, this policy may work at odds with other policies promoting adequate distance buffers and landscape areas. Because buffers and landscaping were judged to be more important than minimizing land consumption by RF facilities, this policy should have a somewhat lower priority than buffer and landscape policies in the event of a conflict.

Policy B. Require colors and materials used for a proposed facility structure to have the least practicable adverse visual effect.

This policy is intended to reduce visual effects of a facility by making its structures less obtrusive. It is a discretionary

standard. It could be made into a non-discretionary standard if more specific.

For instance, it is non-discretionary if it requires use of non-reflective material and silver or blue colors above tree-top level and gray or green colors below tree-top level, and if it prohibits lighting of RF facilities unless required by other agencies or needed for site security and safety.

To implement this policy include non-discretionary provisions to this effects in the standards for an RF facility as a use subject to prescribed conditions, and non-discretionary or discretionary provisions to this effects in the standards for an RF facility as a conditional use.

> Policy C. Require a facility site to be landscaped to reduce adverse visual effects on nearby viewers, particularly in residential areas and areas to which the general public has legal access. Landscape materials should be of a species native to the area when practicable and when the result best obscures the site from view.

This policy is intended to reduce adverse visual effects of a facility by shielding and buffering views of the site from nearby vantage points. It can be discretionary or non-discretionary, depending on the specificity of the standards used to implement it.

To implement this policy, detailed landscape guidelines should

be provided by the County. Landscaping should be required where a transmission facility abuts land in a residential district, public property, or public street.

The County now has landscape standards that could be used for this purpose. See KCC 21.51.040.

Different landscape standards may be needed in rural and urban areas, so the landscaping required is compatible with the general appearance and scale of development in the area of a facility. Regardless of where it is situated, landscaping must be maintained to be effective over time.

Policy D. Require an RF facility to be setback from property lines far enough to protect the public from adverse effects of tower failure or ice fall.

This policy is intended to protect the public from tower failure or ice fall. It is discretionary as stated above. It could be made non-discretionary if the County assumes a tower of a certain type and height will comply if it is setback a certain minimum distance from property lines.

For instance to implement this policy, the County could require an RF facility that complies with the height limit of the underlying zone to be setback at least as much as required for other structures in the zone.

A tower that exceeds the height allowed in the underlying zone could be required to be setback in relation to the height of the tower or to the other features of the tower. For instance, the base of a guyed tower could be required to be setback by at least the greatest distance between the tower base and its guy wire anchors. Since a guyed tower will fail (if at all) so its debris is contained within an area bounded by the guy wire anchors, this provides the requisite protection against harm due to tower failure.

Policy E. Require off-street parking to be provided on a facility site.

This policy is intended to prevent vehicles associated with an RF facility from parking in rights-of-way or on private property off-site. It is discretionary as stated, but could be non-discretionary if a specific number of spaces is required for a given level of use.

To implement this policy in a non-discretionary manner, require an RF facility to have at least 2 on-site parking spaces plus spaces for studios, offices, and other related uses if allowed. A standard to this effect could be applied to all proposed RF facilities. See KCC 21.50.

Policy F. Prohibit a facility that is in a residential zoning district from including non-emergency broadcast studios, general offices, or other functions that are not needed to receive or transmit information.

This policy is intended to reduce the potential for adverse effects from a high level of activity on an RF facility site where such activity is most likely to cause an effect --- in a residential zone. It is non-discretionary.

To implement this policy, the County could impose a standard to this effect in the criteria for an RF facility as a conditional use in a residential zone.

Policy G. Require RF facility operators to cooperate with the County and owners of property in the area of an RF facility to remedy interference with consumer devices caused by the facility and to pay for equipment needed to remedy such interference.

This policy is intended to promote the resolution of interference problems caused by an RF facility. It is non-discretionary, in that the source of most RF interference can be identified reliably. It is discretionary, in that the lengths to which an RF facility operator must go to correct interference depends on the willingness of the operator and the influence of the County and other agencies, particularly the FCC, to motivate the operator.

To implement this policy, the County could require, as a condition of approval of any new transmitting device or structure, that the proponent commit in writing to correct within reason such interference as occurs after a facility is built.

The County could be aided in this effort by the existing industry committee formed to deal with such interference problems. Also the County or an operator could disseminate available information about how to prevent and correct RF interference with consumer devices. See, e.g., FCC Interference Handbook.

At a minimum, RF facility operators should be required to provide the FCC Handbook to anyone to requests it. If the County requires an operator to provide the handbook to the owners of all property within a certain distance of a facility before the facility begins operating, the public most likely to be affected by RF interference from the facility can take steps to reduce the potential for such interference.

> Policy H. Prohibit public access to an RF facility site, but permit public access to open space or recreational resources on or near the site if another means of access to those features is not convenient, provided adequate precautions are taken against harm to the public from contact with electric equipment, from climbing tall structures, or from exposure to RF energy in violation of the health standard.

This policy serves 2 purposes. It protects the public from being harmed due to contact with the RF facility and the various machines and materials on an RF facility site. Also it prevents a facility from obstructing public access to open space and recreational features next to or near a facility.

It is largely a non-discretionary policy. It could be implemented by requiring that a facility site be securely fenced to prevent public access, and by requiring a given level of improvements to provide public access around or through the site. Such standards could apply to an RF facility as a use under prescribed conditions or conditional use.

Policy I. Prohibit a facility from causing adverse noise effects.

The purpose of this policy is self-evident. Although stated in a discretionary way, it could be made non-discretionary easily by requiring a facility to comply with County noise standards. It could be made more stringent in residential or noise sensitive zones by requiring compliance with noise standards that prohibit degradation of existing noise levels in those areas by more than a certain amount.

Policy J. Require a facility to include adequate water and sanitation systems and power and to mitigate adverse effects caused by those systems.

This policy is intended to ensure that potable water and sanitation systems, and power are available with adequate capacity. It is largely non-discretionary; such facilities and services are either available or they are not.

In some areas water or sanitation features may warrant special care. For instance standards for a facility in a water-sensitive area could restrict use of water to the maximum extent possible by using vegetative material that requires little water to grow and by using appropriate water conserving fixtures.

In an area where power or telephone lines could cause adverse visual effects, conditions of approval should reduce such effects. For instance, telephone and electric power lines in a predominantly natural area could be required to be buried or to use existing developed rights-of-way, rather than creating extensive new above-ground rights-of-way.

Policy K. Protect the public against harm due to tower failure and ice fall.

This policy works with Policy H. It is intended to prevent a tower that fails or that collects ice from causing harm to people or property.

To implement this policy the County could require, if a structure for an RF facility exceeds the height of other

structures in the underlying zone, that such structure be built to withstand the most stringent wind and dead load standards in the Building Code to which the structure might be exposed. Also it could require such a structure to include features that reduce ice formation and.or prevent ice that does collect from being carried far off-site by prevailing winds.

NON-CONFORMING USE PROVISIONS

The RF facility district approach could make many existing RF facilities non-conforming, particularly if the RF overlay district is not applied to residential areas.

A non-conforming use is allowed to be maintained as is, but generally cannot be changed unless the change more nearly conforms the use to the requirements of the underlying zone. See KCC 21.52.

This policy is intended to make it hard for a non-conforming use to remain competitive with similar uses in zones where they conform to zoning regulations. It encourages non-conforming uses generally to relocate to areas where they do conform with the zoning.

Many existing RF facilities could be changed to reduce existing adverse effects, without more nearly conforming to the requirements of the underlying zone. Moreover most RF facilities cannot relocate to areas where they are allowed by zoning, because an RF facility often needs to be where it is to work.

Regulating a non-conforming RF facility strictly may reduce the options for reducing existing adverse effects of a facility. This is contrary to the public interest. Therefore the County should adopt the following policy:

Allow changes or expansion to a non-conforming RF facility if those changes or expansion reduce adverse effects of a facility, or if they are needed for the facility to comply with federal, state, or local law.

To implement this policy the County could identify adverse effects of existing RF facilities and means to mitigate those effects.

One such adverse effect could be NIER in excess of some percent of the NIER standard. For instance, a non-conforming RF facility in an area where NIER levels exceed 50% of the standard could be allowed to increase the height of the tower structure so that the NIER levels are reduced by at least some lesser percentage.

While such a change could increase adverse visual effects, it would reduce the potential for adverse health effects. Because the members of the County RF Task Force concurred that he health issue is the most important issue considered, this trade-off may be warranted and consistent with public attitudes.

Lower NIER levels also could be achieved by replacing old equipment with new equipment. If the policy recommended above is adopted, such a change can occur.

One outcome of such changes could be that more RF antennas or users could be accommodated on a site, since new equipment or a taller tower may support them. However the fact that such a change provides more economic value to the RF facility operator should not alter the fact that the public also benefits from the

change.

To implement this policy the County could amend KCC 21.52 to provide specially for changes to non-conforming RF facilities. Such an amendment could list the changes allowed and the corresponding conditions that warrant such changes without further compliance with other provisions of the underlying zone.

TABLE 12

SUMMARY OF COMMON FEATURES

NIER STANDARD

Prohibit NIER that exceeds 1/12.5 the amount that causes a detectable effect on humans based on a consensus of the scientific and medical community.

Vary the NIER allowed with the frequency of the RF energy, with the least NIER allowed in the 30 to 300 MHz range.

Prohibit an RF facility from inducing a current 1/12.5 of the amount that can cause burns on contact with an object near the facility.

Require that NIER levels be verifiable and measureable using tools and expertise available at a reasonable cost. Measure NIER levels when the public reasonably requests such measurements.

If a state or federal agency adopts more stringent NIER standards than the County, amend the County Code.

Require an applicant for a new high power RF facility to show ambient NIER from all sources will not exceed the NIER standard consistent with accepted engineering practices.

Adopt an NIER measurement protocol. Adopt guidelines for when an RF facility is presumed not to exceed the NIER standard without measuring NIER levels.

Prescribe how to abate NIER violations. Allow a reasonable time for private remedies before the County imposes a solution.

DEFINITIONS

Class I RF facility

Class II RF facility

Earth station

Effective radiated/irradiated power

Facility

General population

Hand-held source

Height of antenna above grade

Highest calculated NIER level

Intermittant

Non-ionizing electromagnetic energy

Portable source

Radio frequency (RF) facility

Receive-only RF facility

Source of NIER radiation

Transmission tower or structure

Vehicular source

TABLE 12 (continued)

DESIGN POLICIES AND STANDARDS	NON-CONFORMING USE PROVISIONS
Require and RF facility site and structures associated with an RF facility to be no larger than the size needed.	Require all RF facilities to comply with the NIER standard. If an existing facility violates that standard, abate the violation.
Require colors and materials used for RF facility to reduce obtrusiveness of structures, consistent with FAA rules.	Allow a non-conforming RF facility to change if the change reduces existing adverse effects of the facility. Provide guidelines for the extent of the change permitted by a given mitigating measure.
Require an RF facility site to be landscaped to reduce visual effects near areas that are residential or accessible to the general population.	
Require an RF facility structure to be set back from property lines far enough to protect against adverse effects of tower failure and ice fall and to provide for landscape buffers.	
Require off-street vehicular parking at an RF facility site.	
Prohibit non-essential uses at an RF facility in a residential area.	
Require an RF facility operator to provide information about and to resolve RF interference caused by a facility.	
Prohibit access to an RF facility by the general population, but require access to public areas it adjoins.	
Prohibit an RF facility from exceeding County noise standards.	
Require adequate utilities and services for an RF facility.	
Protect the public against harm due to tower failure and ice fall.	

KING COUNTY ADDENDUM/ERRATA SHEET FOR THE
DECEMBER, 1986, REGULATORY POLICIES REPORT

Page 17, Table 3:

NOTE: The United States has no existing federal standards for non-ionizing electromagnetic radiation (NIER) exposure levels which apply to the general population.

Page 19, 2nd paragraph, 3rd sentence is amended to read:

"However, most of this difference is attributable to differences in methodology and enforcement."

Page 40, 1st paragraph, add the following statement:

"In order for the County to review the impacts of RF facilities upon adjacent properties, the following policy (L) could be adopted:

Policy L: Effects to the land value of nearby residential properties should be considered in the review of the RF facilities."

Page 50, 3rd paragraph, is amended to read:

"However, if the law is intended to prevent harm (due to NIER) to the public, such harm which is clearly shown to result from an existing facility, even an existing facility may be required to comply with a law adopted after the facility was built. (Cite 27, p. 6; Cite 38, pp. 23-26)"

Page 58, 4th paragraph, is amended to read:

"Some authorities exempt facilities transmitting with a transmitter power of 100 watts or less. Most point-to-point microwave facilities operate with power input to the transmitter of 10 watts or less, and many 2-way radio facilities operate between 60 and 100 watts. (Cite 29, p. 1; Cite 30, p. 5; Cite 31, p. 22)"

Pages 84 and 85 (Table 8) and pages 97 and 98 (Table 9):

NOTE: All references to "Policy and Policies" should be changed to "Goal and Goals."

Page 101, Table 10, amend heading to read:

"COMPARISON OF GOALS FOR THE ALTERNATIVE REGULATORY APPROACHES"

Pages 102 and 103:

NOTE: The definitions of classes of RF facilities will be expanded in the regulatory ordinance from the currently listed two classes to include a third class. In addition, there will be a provision for exclusions which will not be subject to the regulatory ordinance.

Page 112, 2nd and 3rd paragraphs, are amended to read:

"With this as background, the County could adopt the following policies:

Policy M: A frequency - and time-dependent health standard should be adopted for ambient RF energy emissions and RF-induced currents from RF facilities that ensures that the general public will not be exposed to more than 1/12.5 (or 8 percent) of the amount of NIER reasonably expected to cause thermal effects or RF burns.

Policy N: New facilities that would cause ambient RF energy levels from that new facility and other existing facilities in the vicinity to exceed the adopted health standard should be prohibited.

Policy O: RF emissions should be encouraged to be as low as possible.

These policies must be reasonable. . . "

Page 116: Insert the attached "page 116."

Page 118: Amend Policy A to read:

"Policy A: Towers and accessory buildings of a proposed RF facility should be no taller or larger than necessary to achieve the purpose of the facility."

Page 119: Amend Policy B to read:

"Policy B: Colors and materials used for a proposed tower and accessory building should have the least practicable adverse visual impact."

Page 120: Amend Policy C to read:

"Policy C: A facility site should be landscaped to reduce adverse visual effects on nearby viewers, particularly in residential areas

and areas to which the general population has legal access. Landscape materials should be of a species native to the area when practicable or existing perimeter vegetation retained, if the resulting vegetative screen best obscures the site from view."

Page 121: Amend Policy D to read:

"Policy D: Towers of a proposed RF facility should be set back from property lines far enough to protect the public from the adverse effects of tower failure."

Page 122: Amend Policy E to read:

"Policy E: Adequate off-street parking should be provided on all RF facility sites."

Page 123: Amend Policy F to read:

"Policy F: An RF facility located in a residential zoning district should not include non-emergency broadcast studios, general offices, or other functions not required to receive or transmit information."

Page 123: Amend Policy G to read:

"Policy G: Owners/operators of new RF facilities should notify owners of property in the area of the RF facility of ways to remedy interference with consumer devices caused by the facility and to remedy such interference in a manner and within the time frame prescribed by the Federal Communications Commission."

Page 124: Amend Policy H to read:

"Policy H: Public access through an RF facility site shall be prohibited unless alternate public access to open space or recreational resources near or adjacent to the site is not available. In such cases, public access to open space or recreational resources should be provided on the margins of the facility site with adequate precautions taken against harm to the public from contact with electronic equipment, from climbing tall structures, or from long-term exposure to NIER in violation of the adopted health standard.

Page 125: Amend Policies I and J to read:

"Policy I: An RF facility should not cause adverse noise effects. For facilities having auxiliary power generators, the use of such generators should not be exempt from the King County Noise Code unless an actual emergency situation exists which requires the use of the generators.

Policy J: An RF facility should provide necessary water, sanitation and power systems and should mitigate adverse effects caused by those systems."

Page 126: Amend Policy K to read:

"Policy K: A tower and its appurtenances should be designed in such a manner as to protect the public against harm due to ice fall."

Pages 128 and 129 are amended to read:

"The adoption of policies and regulatory standards could make existing RF facilities non-conforming. A non-conforming use is allowed to be maintained as is, but generally cannot be changed unless such change results in closer conformance to the requirements of that zone. See KCC 21.52.

Strictly regulating a conforming or non-conforming RF facility may eliminate the options for reducing existing adverse effects of a facility. This is contrary to the public interest. Therefore the County should adopt the following Policy P:

Policy P: Changes to an RF facility should be allowed if those changes reduce adverse health and/or visual effects of a facility.

To implement this policy, the County should identify adverse effects of existing RF facilities and means to mitigate those effects when reviewed through the administrative conditional use, conditional use or building permit process.

One such adverse effect could be NIER in excess of some percent of the NIER standard. For instance, an RF facility in an area where NIER levels exceed the standard by 50% could be allowed to increase the height of the tower structure so that the NIER levels are reduced by at least some lesser percentage.

While such a change could increase adverse visual effects, it would reduce the potential for adverse health effects. Because the members of the County RF Task Force concurred that the health issue is the most important issue considered, this trade-off may be warranted and consistent with public attitudes.

Lower NIER levels also could be achieved by replacing old equipment with new equipment. If the policy recommended above is adopted, such a change can occur.

One outcome of such changes could be that more RF antennas or users could be accommodated on a site, since new equipment or a taller tower may support them. However, the fact that such a change provides more economic value to the RF facility operator should not alter the fact that the public also benefits from the change."

Page 130: Amend 1st paragraph to read:

"To implement this policy, the County could amend KCC 21.52 to provide specifically for changes to RF facilities."

. . . and delete the remainder of paragraph.

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are made should include the point on the property line of the facility closest to the transmitting device, closest to the nearest habitable property or structures off-site, and closest to other public accessible areas adjoining the site if any.

- If ambient RF energy measurements are required for an application for a proposed RF facility, and measurements were made for another RF facility in the vicinity of the proposed facility, the County should allow that applicant to submit ambient RF emission level measurements made for a prior application in the vicinity of the proposed use, if past measurements comply with engineering practices required by the County ordinance.

As an added safety measure, the County could require an applicant to measure ambient RF energy after a proposed facility is built and operating. The purpose of this would be to verify calculations submitted before the County approved the facility.

Such post-construction measurement should be required only when warranted. For instance if the projected ambient NIER levels with the addition of a new facility are calculated to approach the maximum amount of NIER allowed by County standard, such as 75% or more of the maximum amount allowed by County ordinance, then post-construction NIER measurements are warranted to ensure the standard is not exceeded inadvertently.