Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

ET Docket No. 03-137

In the Matter of

Proposed Changes in the Commission's Rules Regarding Human Exposure to Radiofrequency Electronic Fields

Comments of Cingular Wireless LLC

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SUMMARY

The Commission's rules specify particular categories of transmitting facilities which require "routine evaluation" to determine compliance with radiofrequency ("RF") exposure guidelines. All other transmitting facilities are "categorically excluded" from routine evaluation. The NPRM proposes to standardize the criteria for routine evaluation and categorical exclusion across similar services. The proposed rules would consider both total transmitter power and separation distance to determine which facilities require routine evaluation.

For antennas mounted above ground/rooftop levels, the Commission's rules should consider height above ground/rooftop to determine which facilities require routine evaluation. Potential RF exposure declines dramatically when the antenna is mounted more than two meters above ground/rooftop. Failure to consider height above ground/ rooftop will require routine evaluations in a large number of cases where potential exposure to RF emissions in excess of the Commission's guidelines is negligible. In these comments, Cingular proposes criteria for categorical exclusion that consider height above ground/rooftop. These criteria will protect the public from exposure to RF emissions in excess of the Commission's guidelines while limiting the number of facilities that require routine evaluation.

The Commission's proposed treatment of "micro" devices is far too conservative. Cingular demonstrates in these comments that the Commission can substantially increase the power limits for micro devices that are categorically excluded from routine evaluation.

In addition, the Commission's proposed treatment of transmitter modules and reference to OET bulletin 65 are appropriate, the proposed notes to rule section 1.1310 should be adopted and the Commission should adopt a transition period of one year.

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To the Commission:

Cingular Wireless LLC ("Cingular") hereby files Comments in response to the Notice of Proposed Rulemaking ("NPRM") released June 26, 2003 in the captioned proceeding. The NPRM was summarized in the Federal Register on September 8, 2003, 68 FR 173.

The NPRM proposes modifications to Commission rules establishing compliance guidelines for human exposure to radiofrequency ("RF") energy generated by FCC-regulated transmitters and facilities. The Commission proposes modifications to make the rules more efficient, practical and consistent in application. The NPRM expressly does NOT invite comment regarding the RF exposure limits themselves, which were developed in conjunction with other agencies and organizations that have primary expertise in health and safety.[1]

I. Routine Evaluation and Categorical Exclusion of Transmitters, Facilities and Operations.

[1] NPRM, ¶ 5.

The Commission's environmental rules specify particular categories of transmitting facilities which require routine evaluation to determine compliance with RF exposure guidelines. All other transmitting facilities are "categorically excluded" from

routine evaluation because they offer negligible potential for causing exposure in excess of the guidelines based on factors such as operating power and human accessibility.[2] The existing rules are inconsistent across service categories in the treatment of accessibility and separation distance for certain fixed transmitting facilities. In some instances, the rules address both transmitter power and separation distance whereas other rules in other services specify only power levels.[3] The NPRM proposes to consider both total transmitter power and separation distance in the RF exposure requirements and exclusions.[4] The NPRM seeks to make the requirements for routine evaluation and categorical exclusion consistent across similar services.[5]

The proposed rules would require routine evaluation for fixed transmitting facilities where the separation distance from publicly accessible areas is less than three meters, regardless of operating frequency or power.[6] Routine evaluation would also be required where the separation distance from publicly accessible areas is less than 10 meters and the transmitting power is (i) 100 watts ERP or greater for services operating at frequencies below 1.5 GHz or (ii) 200 watts ERP or greater for services operating at 1.5 GHz or greater. Third, transmitting facilities would be categorically excluded from routine evaluation if the separation distance to publicly accessible areas is 10 meters or greater.[7]

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[2] NPRM, ¶ 6.
[3] NPRM, ¶ 7.
[4] NPRM, ¶ 8.
[5] NPRM, ¶ 10.
[6] But see the proposed exclusion for "micro" base stations discussed below.
[7] NPRM, ¶ 11. Separation distance in this context is defined as the minimum distance from the radiating structure of the transmitting antenna in any direction to any area that is accessible to a worker or a member of the general public.

A. The Commission's Rules Should Include Height Above Ground/Rooftop as a Parameter.

The Commission's rules should, where possible, use common approaches to specifying the conditions for categorical exclusion. However, the rules need to distinguish between the "near" field and the "far" field of an antenna in making a categorical exclusion assessment. The use of separation distance and power may work well in the far field and at a distance in excess of 10 meters.[8] However, when in close proximity to an antenna, the height at which the antenna is above the ground or rooftop will greatly affect the amount of radiation potentially received. In a study done for the Cellular Telecommunications & Internet Association ("CTIA"), Ric Tell Associates demonstrated that there is a definite reduction in exposure level as the antenna is raised higher above the roof. Figure 1, below, presents the results of that study. The study measured the exposure that a six foot adult would receive standing in front of the antenna. Most of the reduction takes place in the first six feet of height. Under these conditions, it is extremely important to look at the height above the roof in setting the maximum radiated power limits.

[8] The determination of an antenna's far field is based on both its geometry and frequency. The distance can range from several inches to several hundred feet.

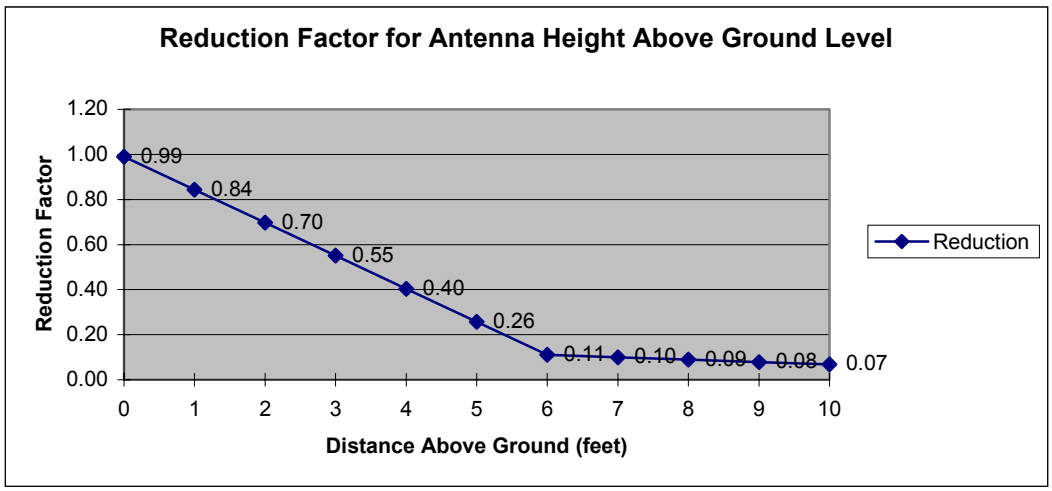

Figure 1. Radiated Power Reduction Factor Based on Antenna Height Above the Roof

If power and separation distance were the only criteria, as proposed in the NPRM, the evaluation would be based on a worst case "line of sight" distance in front of the antenna. This approach severely limits the total power, as shown in the NPRM on Table 1.[9] Figure 2, below, shows that the Maximum Permissible Exposure (MPE) limit of 0.6 mw/cm² is exceeded at a distance of 2 feet or less.

[9] NPRM pages 26-29.

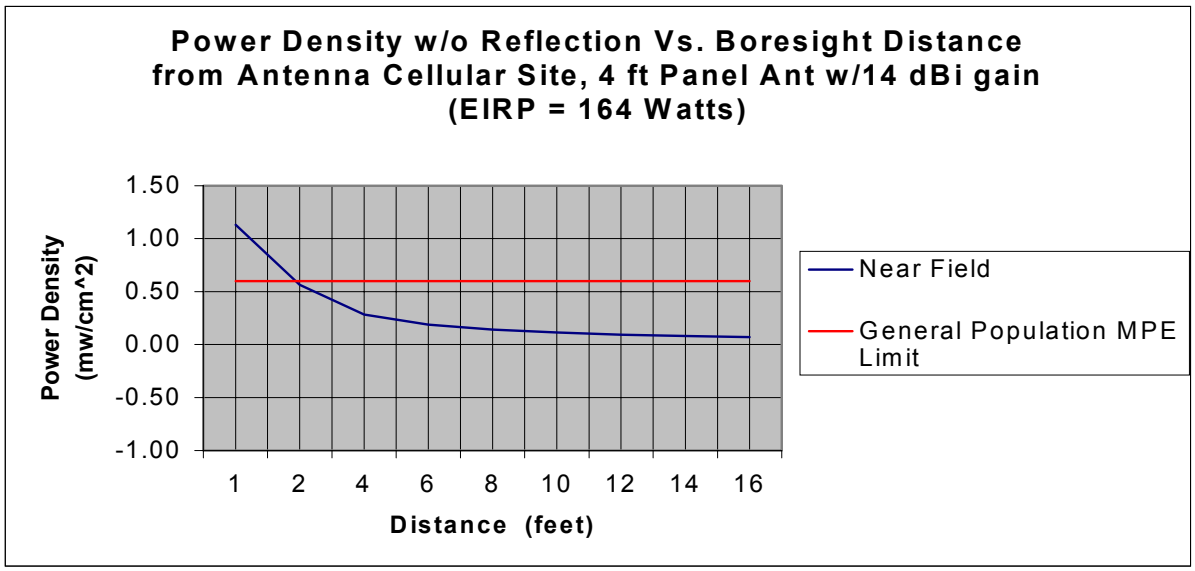

Figure 2. Representative Curve for Cellular Service in Part 22H.

Typically cellular operators design their networks using a transmitter power of 100 Watts ERP per RF channel with up to 20 channels on an antenna which yields a total ERP of up to 2000 Watts. Under the Commission's proposed guidelines this site would have to be evaluated.

On the other hand, (assuming 20 RF channels) if the antenna height above the ground (roof) were 6 feet and the minimum accessible distance in front of the antenna were greater than 3 feet, the site would not have to be evaluated. See Figure 3, below.

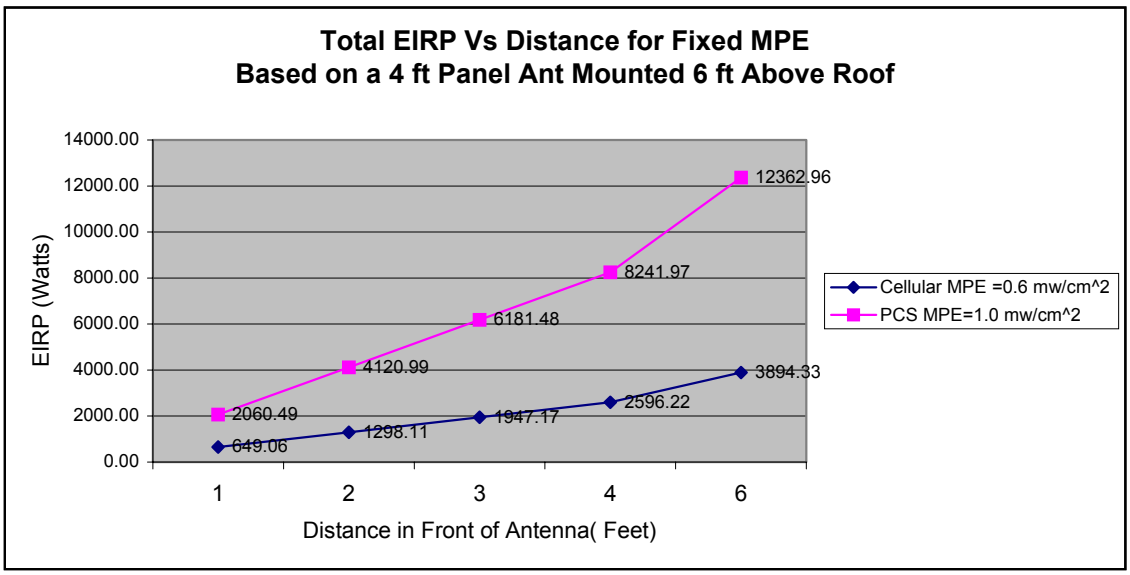

Figure 3. Increase in Permissible EIRP After Applying the Reduction Factor in Figure 1.

While separation distance is important in assessing candidates for categorical exclusion, height of the antenna above ground (roof) is equally or more important. Therefore, Cingular offers the following recommendations for the default limits for Part 22H (cellular) and Part 24E (broadband PCS):

- **Appendix A, Table 1, Column 2 of the Proposed Rules in Notice of Proposed Rulemaking**

  This table should be changed from "EVALUATION REQUIRED IF" to "CATEGORICALLY EXCLUDED IF"

- **Part 22H - Cellular "Categorically Excluded if"**

  1) The line-of-sight distance is >10 meters and the total radiated power is < 4200 Watts ERP (6888 Watts EIRP).

  or

  2) The antenna is < 2 meters above the roof and the total power is < 110 Watts ERP (180 Watts EIRP).

  or

  3) The antenna is > 2 meters above the roof and the total power is < 720 Watts ERP (1181 Watts EIRP).

Notes:

a. The limits in parameter 1 are based on being in the main beam of the antenna.

b. The General Population MPE power limit in parameters 2 and 3 are based on the antenna being mounted a minimum of 2 feet and 6 feet, respectively, above the roof and measured at 2 feet in front of the antenna.

c. Above limits do not take reflected power into consideration.

- **Part 24E - Broadband PCS "Categorically Excluded if"**

1) The line-of-sight distance is >10 meters and the Total radiated power is < 7000 Watts ERP (11,480 Watts EIRP).

or

2) The antenna is < 2 meters above the roof and the Total power is <360 Watts ERP (590 Watts EIRP).

or

3) The antenna is > 2 meters above the roof and the Total power is < 2300 Watts ERP (3772 Watts EIRP).

Notes:

a. The limits in parameter 1 are based on being in the main beam of the antenna.

b. The General Population MPE power limit, in parameters 2 and 3 are based on the antenna being mounted a minimum of 2 feet and 6 feet, respectively, above the roof and measured at 2 feet in front of the antenna.

c. Above limits do not take reflected power into consideration.

Assumptions used in setting the limits:

1. A 4 foot panel antenna w/ 90 degree horizontal beamwidth was used as the standard size for both Cellular and PCS. (This is the most common size antenna used in cell sites).
2. Antenna gains used were 11 dBd for cellular and 13.8 dBd for PCS
3. Typically all tripod mounted roof antennas have the bottom radiating element mounted a minimum of 2 feet above the roof. This is necessary to clear near-by obstructions, e.g.; parapet walls, HVAC units.
4. All height measurements are to the bottom of the radiating antenna surface.
5. Distances within 2 feet of the antenna's radiating surface are considered touching the antenna for most adults.

6. OET Bulletin 65 Section 2 "Predictions Methods" was used to calculate both the far field power density and to calculate the near field power density based on the Ric Tell Cylindrical Model[10]
7. The parameter 1 limits used in both tables assume boresight (worst case) conditions.
8. The default levels have been reduced by approximately 10 % to provide a safety margin.

The default limits presented above have been selected based on anticipated conditions in the field. The rooftop limits in parameters 2 and 3 of Table 1 should be of more concern than water tank or tower mounted antennas. Antenna height above the roof should be the prime concern in determining the default parameters. The break point of two meters is based on an average six foot adult. At two meters, the base of the antenna will be above a six foot adult's head. At this level, the MPEs are drastically reduced, as shown in Figure 1, above. Cingular has surveyed more than 500 rooftops. The vast majority of these sites have antennas mounted on penthouse or elevator shaft walls at heights in excess of two meters. This is due to radiofrequency emission concerns as well as potential building blockage which would affect coverage. Unlike the proposals in the NPRM, Cingular's proposal would not result in a drastic increase in the number of sites requiring routine evaluation. Yet, the public and workers would still be protected from RF emissions in excess of the Commission's MPE limits.

The following graphs illustrate the selection of the default parameters presented in Table 1 above for both Part 22H and Part 24E. Figures 4 and 5 show the maximum EIRP that will meet the general population MPE limits at various distances. At 10 meters (32.8 feet) the calculated maximum allowable EIRP to meet Part 22H is 7352 Watts. For Part 24E, the maximum allowable EIRP is 12,253 Watts.

[10] **OET Bulletin 65 Section 2 Special Antenna Models**

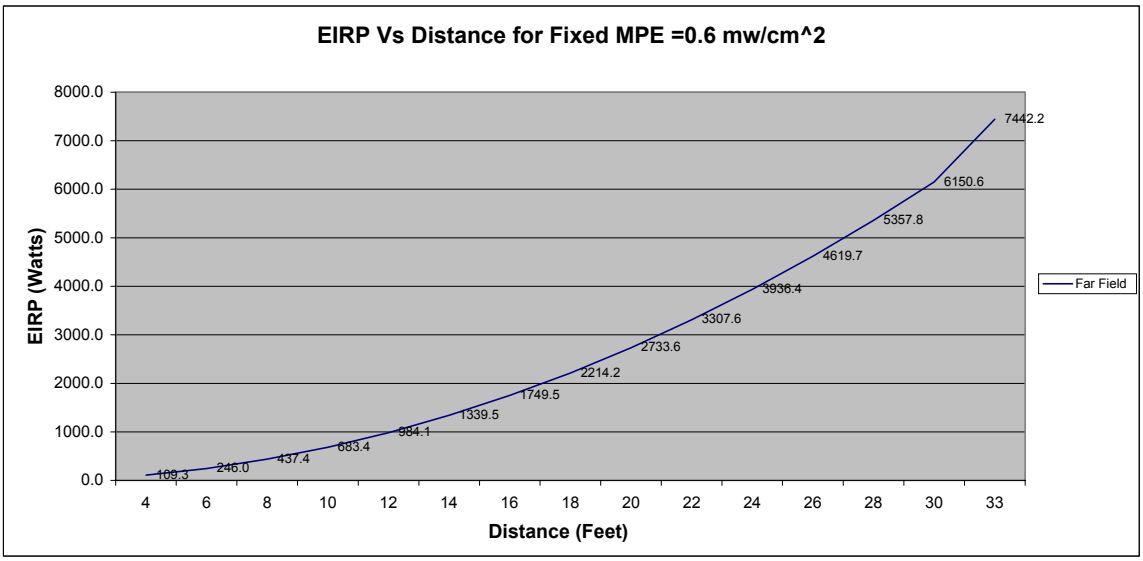

Figure 4. Maximum EIRP vs. Distance for Part 22 Operators.

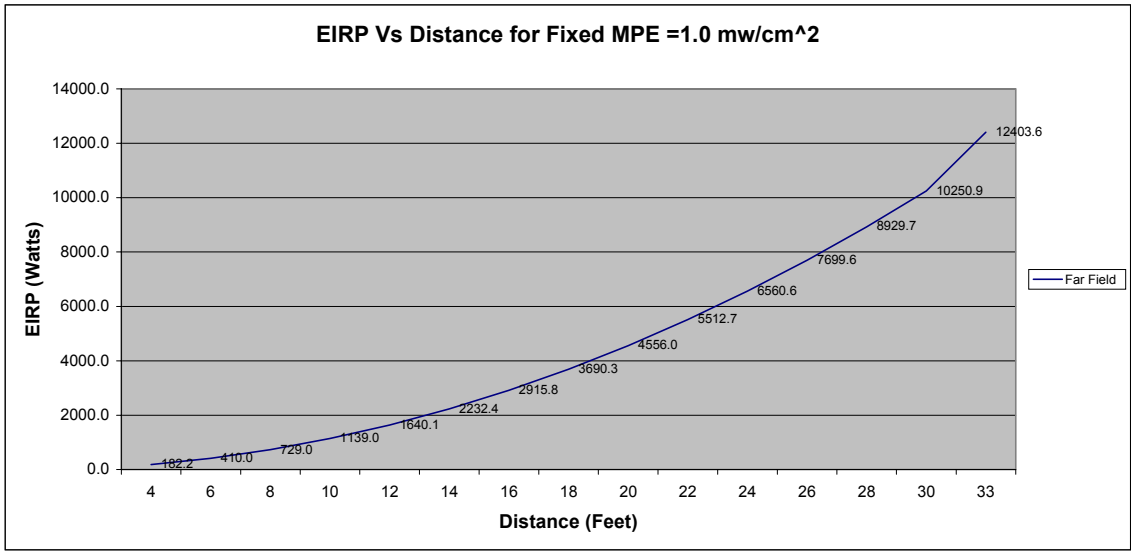

Figure 5. Maximum EIRP for Part 24E Operators.

The graphs in Figures 4 and 5 above are based on "Far Field" calculations and are intended to show the maximum levels of transmitted power (EIRP) at distances around

10 meters (32.8 feet). These graphs are valid for distances in excess of 25 to 30 feet and they assume the MPE measurements were taken in the main beam of the antenna without reflected radiation. The limits proposed in both tables have been reduced by approximately 10 % to provide a margin of safety and to round the EIRP value off to the nearest even number of watts.

The limits proposed for parameters 2 and 3 in Tables 1 and 2 above are primarily designed for rooftop installations where the separation distances are much closer than those experienced on the ground from towers. Under these conditions, it is much more important to look at the height above the roof in setting the maximum radiated power limits. Figure 1 above shows the calculated reduction factor that can be applied to the radiated power based on the antenna's height above ground (roof) level. Note that there is a very pronounced knee in the curve at a height of 6 feet. It is for this reason that the limits in parameters 2 and 3 were set at <2 meters and >2 meters, respectively.

The separation distances experienced on the rooftop are generally in the near field of the antenna. The graphs below were calculated using the "Ric Tell Cylindrical Model" for near field power density approximations. Figures 6 and 7 below show the maximum EIRP that can be radiated from a 4 foot panel antenna with a 90 degree horizontal beamwidth. Figure 6 assumes that the antenna is mounted 2 feet above the roof and Figure 7 assumes that the antenna is mounted at 6 feet above the roof.

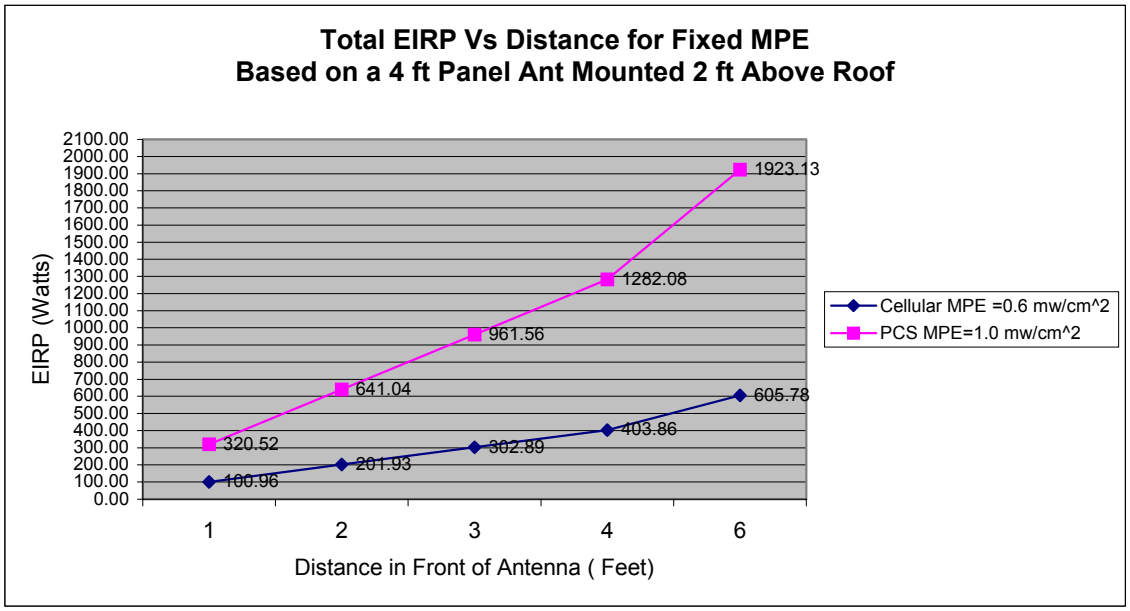

Figure 6. Maximum EIRP vs. Distance in Front of an Antenna mounted 2 feet above the roof.

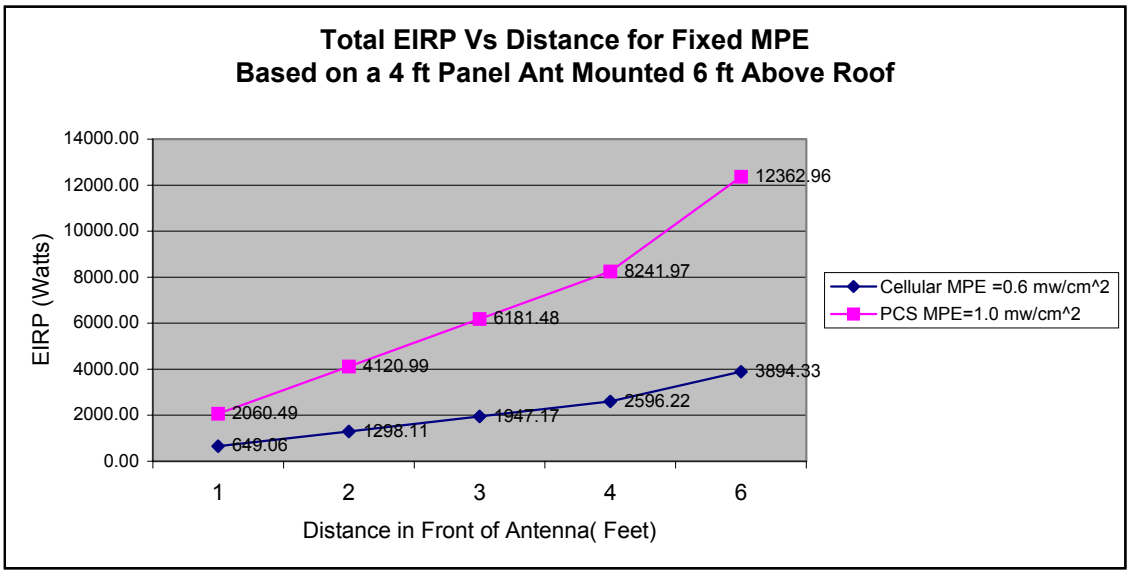

Figure 7. Maximum EIRP vs. Distance in Front of an Antenna Mounted 6 Feet Above the Roof.

As Figures 6 and 7 demonstrate, taking into consideration the height above ground or the rooftop would allow the Commission to adopt higher power limits for categorical exclusion from routine evaluation without exposing the public or workers to RF levels in excess of the MPE limits found in the Commission's rules.

B. The Commission's Proposed Treatment of Micro Devices is Much Too Conservative.

The NPRM seeks comment on the criteria for categorical exclusion from routine evaluation for very low-power fixed transmitters, such as indoor "micro" base stations and similar fixed devices. The Commission proposes to exclude devices mounted in such a way that persons are not normally closer than 20 cm from any part of the radiating structure if the device emits less than 1.5 W ERP for transmitters operating at frequencies at or below 1.5 GHz and 3 W ERP at frequencies above 1.5 GHz.[11] The NPRM acknowledges that these limits were developed using conservative assumptions and could require routine evaluation for some installations that are unlikely to exceed the RF exposure guidelines. It tentatively concludes that the advantages of simplicity and certainty in this approach outweigh the requirement to conduct additional evaluations.[12]

Cingular agrees with the concept of providing default parameters where ERP is at or below a certain value, thereby exempting a site from completing a survey. In addition, antennas used with micro base stations located in office buildings, shopping malls, and other public areas should not require a survey to insure compliance. These antennas are generally mounted in or above the ceiling tiles and are generally 2 feet or more above the head of a six foot adult. While the proposed limits of 1.5 W ERP and 3.0 W ERP are

[11] NPRM, ¶ 14.
[12] NPRM, ¶ 15.

representative of the power levels used in micro base stations, these limits can be raised substantially as shown in Figure 8 below.

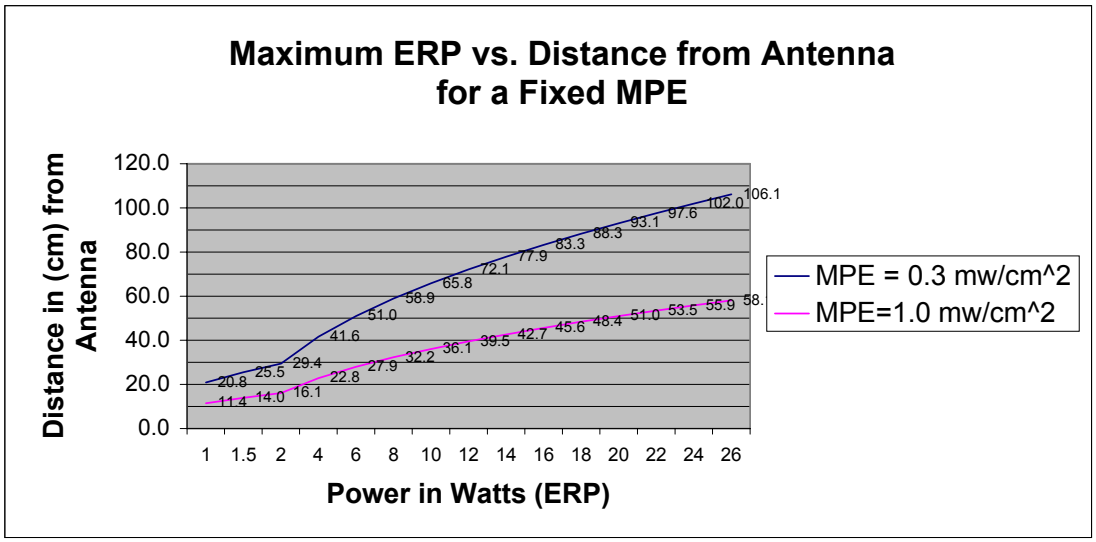

Figure 8 Maximum ERP vs. Distance for fixed MPE's

Figure 8 shows the ERP vs. distance in centimeters for transmitters below and above 1.5 GHz for fixed MPEs of 0.3 mw/cm² and 1.0 mw/cm², respectively. Based on Figure 8, above, Cingular recommends that the default limit for all antennas in this category be set at 8W ERP for frequencies below 1.5 GHz and 26 W ERP for frequencies above 1.5 GHz. These limits are based on a distance of 2 feet (60 cm) in front of the antenna. These limits are consistent with the default values developed for Table 1, above.

C. The Commission's Proposed Treatment of Transmitter Modules is Appropriate.

The NPRM seeks comment on issues raised by modular RF emitters ("transmitter modules") designed for use in consumer electronic products such as wireless headset (speaker and headphone) connections to PCS and cellular phones, wireless connections to

local area networks (LANs) for desktop and laptop computers, and wireless connections to service provider networks for personal digital assistants (PDAs) and other like devices. The NPRM seeks information needed to provide rules and guidelines for the approval and safe use of transmitter modules with a minimum of regulatory burden.[13] Requirements for evaluation and categorical exclusion of transmitter modules would be based on the power levels of the modules, combined with the installation configurations and situations in which they would be used.

For radiotelephones, pagers, and other devices that are used in close proximity to the head or body, the NPRM proposes that no Specific Absorption Rate (SAR) evaluation be required subsequent to the addition of a transmitter module that operates at or below 2 mW (peak radiated or conducted) output power. For transmitter modules operating at power levels above 2.5 mW, the NPRM proposes to evaluate SAR limit compliance in combination with the host device.[14] Cingular concurs with these recommendations.

II. Reference to OET Bulletin 65 is Appropriate.

The Commission's rules require that SAR exposure compliance of portable devices be tested using technically acceptable protocols, procedures and standards. Guidance on acceptable procedures is provided in Supplement C of OET Bulletin 65. The NPRM proposes that rather than refer to a specific document that can become outdated, the rules be modified to include a generic reference to Supplement C, so that as SAR guidelines are refined by experts, they can be accommodated more quickly without waiting for rule amendment.[15] A generic reference to OET Bulletin 65 Supplement C in

[13] NPRM, ¶¶ 19-20.
[14] NPRM, ¶¶ 23-24.
[15] NPRM, ¶ 34.

the rules is appropriate as long as the Commission provides for public comment on any revisions to OET 65 and/or its supplements.

III. The Proposed Notes to Rule Section 1.1310 Should Be Adopted.

The Commission's RF guidelines contain two tiers of exposure limits, one for the general public and a second, less restrictive one for workers. The distinction is based on the premise that workers are aware of their exposure and have means at their disposal to effectively control their exposure. The NPRM proposes to adopt Notes to Rule Section 1.1310 to explain that workers must be "fully aware" of the potential exposure and can exercise control over their exposure. To be considered "fully aware" a worker must receive written and verbal information concerning the potential for RF exposure and must be trained regarding appropriate work practices to control or mitigate exposure. A Note would also define "exercise control" and would establish standards for signage and labels warning of the potential for RF exposure.

Cingular concurs with the proposed Notes to Section 1.1310. These definitions and requirements reflect standard industry practice and will clarify the responsibility of licensees and grantees with regard to occupational exposure.

The NPRM also proposes to correct an oversight in Section 1.1310 of the rules by reflecting SAR values as well as MPE values, so that an applicant will have a choice of evaluating RF exposure compliance against either the MPE value or the SAR value. Cingular concurs that the SAR values should be added to Section 1.1310.

IV. A Transition Period of One Year is Appropriate.

Paragraph 49 of the NPRM proposes a transition period of six months to allow licensees to become familiar with the new rules and to conduct routine evaluations where

they are newly required by the revised rules. The rules as proposed would require for the first time a large number of routine evaluations of sites that are categorically excluded under the existing rules. A transition period of one year would be more reasonable in light of the proposed rule changes.

V. Conclusion.

The elimination of antenna height above the ground/rooftop as a criteria and the consequent lowering of power levels would require routine evaluation in many more cases than under the current rules to no public benefit. For the reasons demonstrated above, Cingular urges the Commission should retain antenna height as a criteria as set forth in these Comments.

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