Before the
Federal Communications Commission
Washington, D.C. 20554

MM Docket No. 88-508

In the Matter of

Improved Methods for Calculating
Skywave Field Strength in the
AM Broadcast Band

NOTICE OF PROPOSED RULE MAKING

Adopted: October 13, 1988; Released: November 4, 1988

By the Commission:

INTRODUCTION

1. The Commission is initiating this proceeding (*Notice*) to examine its Rules relating to skywave propagation in the AM broadcast service. In particular, the Commission is considering replacing the existing skywave propagation curves contained in the FCC Rules with a new skywave propagation model recently developed. The Commission believes that this new model is more accurate and reflects the latest understanding of skywave propagation as applied to the AM broadcast service.

2. This proceeding is an outgrowth of the *Notice of Inquiry*, MM Docket No. 87-267, 52 FR 31795, August 24, 1987, (*Inquiry*) which provided a comprehensive review of the Commission's AM broadcast assignment criteria and related matters.[1] Its goal was to identify any needed changes to the Commission's Rules which would permit AM stations to improve their service to the public and enhance their ability to compete in the market place.[2]

3. The Commission discussed a number of issues specifically related to skywave propagation in its *Inquiry*. In particular, one alternative discussed is to replace all of the current skywave propagation curves and procedures in the FCC Rules with a new, improved skywave propagation model recently developed by FCC staff. Several related matters were also discussed in the *Inquiry*, notably, the effects of geomagnetic latitude of a propagation path upon skywave field strength, the most appropriate hour of the night upon which to base the new propagation model (referred to as the reference hour), procedures for calculating field strength values exceeded for 10% of the time, and calculation procedures to be employed for short propagation paths.

4. We recognize that changes to the Commission's Rules to reflect new procedures for calculating skywave field strength may well have, among other things, an effect on the portrayal of existing service and interference as well as an effect upon future calculations related to new and modified AM facilities. However, we believe that consideration at this time of procedures providing improved accuracy would facilitate future consideration of other possible changes to the Commission's technical assignment criteria. This would provide accurate skywave field strength calculations for use in assessing the interrelationships of such proposed changes. Ultimately, improved accuracy in skywave calculations would ensure that proposed new or modified AM stations would provide intended protection to other stations, or, conversely, that such proposed changes would not be unnecessarily restricted.

5. A substantial number of public comments addressing skywave propagation issues were received in response to the *Inquiry*. These comments provide a general consensus supporting consideration of the new and improved methods for calculating skywave field strength suggested by the Commission in its *Inquiry*. For all of the reasons discussed, we believe that the time is now ripe for considering changes to the procedures for calculating skywave field strength as proposed in the following sections.[3] Before addressing these proposed changes, however, the following background information is provided.

BACKGROUND

6. The AM broadcast service is the oldest broadcasting service, but it still remains one of the most technically complex to administer. This is due in large part to the propagation conditions that exist in the AM broadcasting band. In contrast to the other frequency bands where broadcast services are authorized, the propagation characteristics of the AM band vary with the time of day. During day time hours, signal propagation of an AM station is predominantly by groundwave signals. Groundwave signals travel along the surface of the earth and are thus affected by the characteristics of soil conductivity along the propagation path.

7. During nighttime hours, however, skywave signals from an AM station reach distances many times greater than its groundwave signals. Skywave signals are reflected from the ionosphere[4] and can be propagated many hundreds of miles from the transmitter location. Nighttime propagation has both positive and negative implications. On the one hand, nighttime skywave can be employed to provide skywave service many hundreds of miles from the transmitter, whereas, on the other hand, such enhanced conditions also increase the interference possibilities of co-channel stations over distances of hundreds of miles. As a consequence, co-channel stations that could be located reasonably close to one another without interference during daytime hours could cause significant mutual interference during nighttime hours.

8. Field strength calculations for determining skywave service and skywave interference are performed in accordance with Section 73.182 of the FCC Rules. Currently these procedures employ three sets of skywave field strength curves contained in Section 73.190 of the FCC Rules. The first set of curves, Figure 1a, is used for calculating the skywave service areas for Class I stations as well as the levels of interfering field strength for Class I and Class II stations on clear channels; hence, they are sometimes referred to as the FCC clear channel curves.[5] A second set of curves, Figure 2, isused for calculating levels of skywave interference on regional and local channels. Figure 1b, the third set of curves, is used for all skywave field strength calculations involving one or more stations in Alaska regardless of channel or station class.[6]

9. These three sets of skywave curves are empirically derived, that is, they are based upon observations of propagation phenomena obtained through FCC skywave field strength measurement programs. For example, Figure 1a

was derived from short-term field strength recordings taken in the spring of 1935.a relatively low solar activity period (*i. e.*, a period corresponding to low sunspot numbers).

10. In order to gain a better understanding of skywave propagation phenomena, the FCC initiated a long-term field strength measurement program in 1939 which continued for a full solar activity cycle, *i. e.*, eleven years. Soon after this program began, it became clear that skywave field strength is a function of many factors, including latitude and sunspot number.[8] Figure 2 was then developed from data acquired for the year 1944 of this long-term program.[9] Minimum solar activity occurred in 1944 resulting in maximum levels of skywave field strength. Such a year represents a "worst case" for determining the effects of skywave interference upon the service provided by AM stations during nighttime hours.

11. Data from the Commission's long-term field strength measurement program for 26 propagation paths were released in 1971 and have been studied by the FCC as well as a number of researchers from different parts of the world. Among other things, it has been found that the effects of latitude are so great that the 1944 FCC data, which represents only a narrow range of latitudes, are inadequate. Consequently, in order to collect supplemental data, the Commission in 1980 initiated a low-latitude skywave measurement project (Central America to southern U.S.) and in 1981 initiated a high-latitude measurement project (coterminous U.S. to Alaska).[10] Several administrations (*e. g.*, Brazil and Mexico) have contributed a substantial amount of data from the low-latitude areas. The high-latitude field strength measurement program contributed to the development of the interim curve in Figure 1b of the FCC Rules discussed *supra*. In adopting Figure 1b, it was anticipated that a final set of curves would be developed upon conclusion of the measurement project.

DISCUSSION

12. The FCC staff has continued its efforts to develop a better understanding of skywave propagation phenomena. Based on analysis of data collected during the Commission's long-term skywave field strength measurement program as well as data collected during the more recent low-latitude and high-latitude skywave measurement projects, our understanding of skywave propagation characteristics has improved significantly. As a result, we have identified certain shortcomings of the current FCC skywave field strength curves.

13. We now know that skywave at tenuation increases by about 1 dB (in a year of low sunspot activity) for every degree of latitude that a radio path midpoint moves farther north. This reduces skywave propagation in northern areas by an appreciable amount. For example, a station in Texas may produce a skywave signal of 0.5 mV/m at a distance of 800 miles from its transmitter; that same station in Minnesota may produce a 0.5 mV/m signal at a distance of only 500 miles. Figure 1a of Section 73.190 of the FCC Rules does not provide a means for adjusting skywave field strength as a function of geomagnetic latitude. Figure 2 is partially correct in its conceptual approach because it treats interference levels as a function of geographic latitude. Geomagnetic latitude rather than geographic latitude is the more determinative factor.[11] The effect of these shortcomings is magnified by the increasing demand for spectrum and growing concerns regarding nighttime interference as the band becomes more congested.

14. Other important characteristics of skywave propagation also have been observed during the staff's on-going studies. Use of a reference hour of six hours past sunset (SS+6) rather than two hours past sunset (SS+2) is a more accurate reference upon which to base skywave calculations. Moreover, it has been determined that use of the slant distance for a propagation path rather than the great-circle path distance results in greater accuracy.[12] Finally, it has been learned that differences between skywave field strength exceeded 50% of the time and skywave field strength exceeded 10% of the time vary with the geomagnetic latitude midpoint of the propagation path.[13]

15. The following proposed changes to the Commission's current Rules for calculating skywave field strength incorporate all of these observed skywave propagation characteristics. These proposals address, *seriatum*, a new skywave propagation model, use of the slant distance of a propagation path, a new proposed reference hour for the new propagation model, and a procedure for calculating skywave field strength exceeded 10% of the time. Comments are invited on these proposed changes, and, in addition, the Commission will consider alternative proposals which may provide potential improvements related to calculating skywave field strength in the AM broadcast service.

16. *New Skywave Model.* The *Inquiry* discussed several alternatives for improving methods for performing skywave field strength calculations, including various modifications to the existing curves in Section 73.190 ofthe FCC Rules. Emphasis was placed, however, upon consideration of replacing all of the existing curves, Figures 1a, 1b, and 2 of Section 73.190 of the FCC Rules, with a new model identified as the "modified method".[14] Studies performed by members of the FCC staff indicated that this "modified method" ismore accurate than the three sets of curves currently in Section 73.190 of the FCC Rules and takes into account the effects of the geomagnetic latitude of the propagation paths.

17. Comments filed in response to the *Inquiry* were overwhelmingly in favor of using the most advanced method available and recommended use of the"modified method". Comments submitted by the Corporation for Public Broadcasting (CPB) typify several of the comments received. CPB noted that reliance on precise methodologies and current data will ensure that the assignment principles continue to reflect the real world, not a theoretical environment. Moreover, CPB indicated its belief that the imprecision of thecurrent propagation curves is, for the most part, unnecessary with the availability to the FCC and the industry of sophisticated computer technology and extensive data previously unavailable.

18. Based upon its review of the "modified method", Capital Cities/ABC, Inc. (Capital Cities) concurs that this method should be used in determining protected contours as well as interference levels. CBS, Inc. (CBS) supports the Commission's effort to implement the most current data and precise methods for calculating interference. CBS notes that where accurate measurements of interfering signals and protected contours are not available, interference may be caused where none was calculated, or the parameters of a station may be unnecessarily constrained. The Clear Channel Broadcasting Service (CCBS), how-

ever, urges the Commission to proceed with caution in this proceeding. CCBS expressed general concerns about the potential adverse consequences of recalculating service and interference that could result with a new propagation model.

19. Based upon the comments and our own assessment of the benefits that would be derived from adoption of an improved skywave propagation model, we propose amending the Rules to incorporate the use of the new propagation model described in Appendix B of this *Notice*. This new model is based upon the empirical data collected by the Commission during its extensive skywave measurement programs and is characterized by a formula. This new model is identical to the "modified method" discussed in the *Inquiry* except for differences discussed *infra*.

20. An important element included in the new skywave propagation model is a term that fully accounts for the effect of the geomagnetic latitude of the propagation path on skywave field strength. As discussed *supra*, geomagnetic latitude has a significant effect upon propagated skywave field strength. The inclusion of this term would result in a more accurat edepiction of skywave service contours for Class I clear channel stations as well as interference calculations on all channels.[15] We are proposing to usethe geomagnetic latitude of the great-circle midpoint of the propagation path for these calculations. Appendix B also includes formulas for converting geographic latitude to geomagnetic latitude.

21. Although it is possible to derive graphical methods from the formulas for determining skywave field strength, we propose to make the formulas in Appendix B controlling in order to avoid disputes that can result from in accuracies of graphical methods. This action would be consistent with recent Commission actions in other cases where use of available formulas has been made controlling for the same reason. Additionally, since calculations based on the formulas would prevail in all cases and since the new propagation model is easily adapted for use on computers, we do not believe there is need to include curves in the FCC Rules.[16]

22. *Use of Slant Distance.* In our discussion of the "modified method" in the *Inquiry*, we had suggested that great-circle distances would be used in the calculations for propagation paths of 200 km and greater. For propagation paths less than 200 km, it was suggested that the field strength factor at 200 km could be employed in the calculations at such distances.[17] There was general support in the comments received in response to the *Inquiry* for such an approach.[18] However, recent analysis conducted by the Commission indicates that it would be more accurate to use the slant distance for all propagation paths, regardless of path distance.

23. This conclusion is consistent with CCIR Recommendation 435 which recommends use of the slant distance for calculating skywave field strength for all propagations paths.[19] The accuracy of skywave calculations is most notably improved by use of the slant distance over any propagation path where the slant distance is large in relation to the great-circle distance. Medium waves are usually reflected by the E layer of the ionosphere which spans the altitude range of approximately 90 to 130 km. The current FCC Rules assume the average height of the E layer to be 96.5 km. Thus, even for a receiving point only 1 km away from the transmitter, the skywave may travel 193 km to reach its destination. An increase between the transmitting and receiving points, within a certain range, will not result in a significant change in the slant distance. For example, if the distance between the two points is increased to 100 km, the actual slant distance only increases 24 km. Thus,the skywave signal must travel nearly as far to reach a receiver near the transmitter as it does to reach a receiver several hundred kilometers away.

24. The new propagation model that we are proposing specifies use of slant distance for all propagation paths, regardless of path distance. This ensures use of the most accurate calculation methodology without significantly adding to the complexity of the calculations. For the purpose of the new model, it should be noted that the height of the E layer of the ionosphere above the earth is assumed to be 100 km. The elevation angle for the propagation path would continue to be determined on the basis of the actual great-circle distance in accordance with the formula in Section 73.190(d) of the FCC Rules.

25. *Reference Hour.* Several decades ago, the FCC adopted two hours after sunset (SS+2) as the reference hour for its propagation models in AM broadcasting. It was believed that the ionosphere was fully stabilized and field strength maximized at two hours after sunset. This early conclusion subsequently has been found to be incorrect. Soon after the FCC started itslong-term measurement program in 1939, it became apparent that field strength sat SS+6 were appreciably stronger than those at SS+2.[20] It was assumed that the difference was one of degree only. More recent studies, however, show that propagation conditions at SS+2 and SS+6 are significantly different. It is far more than a difference of degree; it is a difference of kind. It has been shown that at SS+2 the residual effect of the D layer of the ionosphere still exists, complicating the prediction of skywave field strength. On the other hand, at SS+6 the effect of the D layer no longer exists and skywave propagation primarily occurs by reflection from the E-layer of the ionosphere and occasionally from the F-layer.

26. Recent findings also indicate that skywave field strengths at approximately SS+2 display a certain degree of frequency dependence (approximately 3 dB stronger at the higher frequencies). At SS+6, frequency dependence becomes insignificant. Thus, we have concluded from our studies that the current curves in Section 73.190 of the FCC Rules which are based on the reference hour of SS+2 are more accurate at the higher frequencies. We believe that use of the reference hour of SS+6 for the new skywave propagation model would result in improved uniformity throughout the AM band and all frequencies would be treated in the same manner.[21]

27. There are also indications that use of SS+6 as the reference hour would result in skywave field strength predictions that are more uniform for propagation paths in all directions. Based on data collected by the FCC corresponding to SS+2, Crombie (*IEEE Transactions on Broadcasting*, September 1979) reported that at tenuation by the ionosphere on east-west paths is greater than that for paths in other directions. Thus, observed field strengths on north-south paths are usually stronger than those on east-west paths of comparable lengths at SS+2. Comparison with measured data indicates that Figure 1a of Section 73.190 of the FCC Rules appears to be more accurate for north-south paths. Very recently, a large amount of data for SS+6 has been studied by Commission staff and the effects of path orientation reported for data collected at SS+2 were not noted.

28. Finally, Commission studies have determined that the attenuation of field strength related to sunspot number is less pronounced at SS+6. In preparation for the Region 2 Administrative Radio Conference to Plan the Band 1605-1705 kHz, Commission staff studied a large amount of previously unanalyzed or partially analyzed measurement data, including measurements taken at SS+6. Among other things, it has been found that the at tenuation of field strength corresponding to the number of sunspots is the greatest during the period of daytime to SS+2 (*i. e.*, during the hours that the D layer of the ionosphere affects skywave propagation). This at tenuation gradually diminishes after SS+2 and reaches a minimum at approximately SS+6.[22]

29. Most public comments received in response to the *Inquiry* on this issue generally supported using SS+6 as the reference hour for the new propagation model. For example, CCBS indicated its belief that it is imperative that SS+6 be used if the objective of the new propagation model is improved accuracy. The Association for Broadcast Engineering Standards, Inc.(ABES) recommended including this issue in this *Notice* for further consideration. On the other hand, Edward A. Schober, consulting engineer,(Schober) commented that SS+2 provides a good weighting for the time of maximum radio listenership during the night hours. Likewise, Bonneville International Corporation (Bonneville) suggested retaining SS+2 as thereference hour, or, alternatively, defining protection standards 24 hours a day by using the Commission's diurnal curves contained in Figure 12 of Section 73.190 of the Rules.

30. After considering the comments and the results of our own studies on this matter, we have concluded that use of SS+6 as the reference hour for the new propagation model has merit. We believe that this would ensure uniform calculations for all frequencies and propagation paths. Moreover, this reference hour would better represent the "worst case" for interference calculations, thus minimizing the levels of new interference that would be introduced in the future. The formula in Appendix B for the new propagation model includes a 2.5 dB factor to account for the greater field strength that occurs at SS+6.

31. *Conversion Factor for 10 % Skywave Field Strength.* A final matter that needs to be considered concerns the procedure for calculating skywave field strength exceeded 10% of the time. The new model being proposed depicts field strength values exceeded 50% of the time and it is necessary to apply a factor to convert to field strength exceeded 10% of the time. As noted earlier in this *Notice*, field strength exceeded 10% of the time is used in calculating skywave interference, whereas, skywave field strength exceeded 50% of the time is used for calculating the skywave service contours for Class I clear channel stations. Commission studies of skywave propagation data indicate that this conversion factor is affected by the midpoint geomagnetic latitude of the propagation path. Thus, this factor varies from approximately 6 dB in the low-latitude areas (*e. g.*, Mexico) to more than 10 dB in the high-latitude areas (*e. g.*, Oregon and Alaska).[23] For administrative convenience,an 8 dB factor was adopted in the Final Acts of the Region 2 Administrative Radio Conference (1981, Rio de Janeiro) and is currently specified in Section 73.190 of the Rules for use with Figure 1a in the coterminous U.S.[24]

32. Most commenting parties responding to the *Inquiry* did not provide guidance on this issue. CCBS and Schober suggest calculation of the applicable factor for each path. CCBS further suggested development of a simple curve to portray the variation between 50% and 10% field strength values with geomagnetic latitude. In contrast, Bonneville suggested that a uniform factor of 8 dB is acceptable.

33. There are several alternatives that could be considered for determining the conversion factor. One alternative would be to use a single factor, *e. g.*, 8 dB, for all propagation paths. Another would be to establish several factors that would be applicable in three zones defined by latitude. However, none of these approximations would provide the degree of accuracy that would result from specific calculations of the factor for the actual geomagnetic latitude for any given propagation path. We believe, therefore, that a procedure that would require the specific conversion factor to be determined for each propagation path is preferred and would optimize accuracy for interference calculations on such paths. A formula, shown in Appendix B,has been developed that depicts the conversion factor as a function of geomagnetic latitude. We are proposing use of this formula in determining the applicable conversion factor.

OTHER MATTERS

34. Several parties commenting in response to the *Inquiry* were concerned about the impact that use of new skywave propagation curves would have on the existing AM broadcast service. For instance, although endorsing the use of more accurate skywave curves, several commenters urged the Commission not to implement their use until other AM assignment criteria were fully considered in rule making. ABES and CBS, for example, are supportive of the "modified method", adding that a rule making proceeding on this subject should be instituted. Such a proceeding, according to ABES, would permit a more detailed evaluation of its technical aspects as well as the potential impacton existing AM broadcast service such as changes in interference levels to existing stations, issues related to the processing of applications, and the potential for added administrative burdens. CCBS cautions that adoption of a new skywave propagation model could lead to massive disruption of AM service as interference and service areas are recalculated. As a result, CCBS urges the Commission not to move forward with a change in the methods for predicting AM skywave propagation unless and until the Commission has concluded its investigation into the other related topics set forth in the *Inquiry*.

35. As we discussed *supra*, we are cognizant of the relationship between the skywave propagation model which we are considering in this *Notice* and other assignment criteria that may be considered in future rule making proceedings. We noted in the *Inquiry* that use of a new propagation model could result in changes to the location of service contours and calculated levels of interference. The Commission's staff has performed calculations using the "modified method" on a limited number of regional channels and clear channels which are believed to be representative channels.[25] These studies generally indicate that the predicted nighttime service of Class III stations using a reference hour of SS+2 will be greater than previously depicted using current calculation procedures. On the other hand, use of a reference hour ofSS+6 reduces the calculated service area. In the case of clear

channel stations, the staff's calculation at a reference hour of SS+2 indicates that the skywave service areas of class I stations are substantially reduced at higher latitudes, and to a lesser degree at a reference hour of SS+6.[26]

36. We do not believe, however, that this fact should restrict us from proceeding with rule making at this time in order to develop a record on this issue.[27] Such a record will guide the Commission on appropriate actions which ultimately should be taken. We believe, however, that there may be practical reasons for considering a delay in implementing a new propagation model, if adopted, until consideration of other possible changes to interrelated technical assignment criteria is concluded. Rather than implementing various changes to the technical assignment criteria in a "piece meal" fashion, there may be merit in considering implementing simultaneously all the inter related changes that may ultimately be adopted. This approach could minimize administrative burdens for the Commission as well as uncertainties within the industry. We seek comment on the advisability of such an approach.

37. It would not be our intent to require any modifications of existing operations as a result of the changes proposed in this Notice. Moreover, we believe that the same principle would apply to applications pending at the time any changes proposed herein are implemented.

ADMINISTRATIVE MATTERS

38. Authority for the rule changes on which comments are invited is contained in Sections 4(i), 303, and 307 of the Communications Act of 1934, as amended, 47 U.S.C. 154(i), 303, and 307.

39. Pursuant to applicable procedures set forth in Sections 1.415 and 1.419 of the Commission's Rules, interested parties may file comments on or before **December 27, 1988** and reply comments on or before **January 11, 1989.** All relevant and timely comments will be considered by the Commission before final action is taken in this proceeding. To file formally in this proceeding, participants must file an original and five copies of all comments, reply comments and supporting comments. If participants want each Commissioner to receive a personal copy of their comments, an original and nine copies must be filed. Comments and reply comments should be sent to the Office of the Secretary, Federal Communications Commission, Washington, D.C. 20554. Comments and reply comments will be available for public inspection during regular business hours in the Dockets Reference (Rm. 239) of the Federal Communications Commission, 1919 M Street, N.W., Washington, D.C. 20554.

40. For the purposes of this non-restricted notice and comment rulemaking proceeding, members of the public are advised that *ex parte* presentations are permitted except during the Sunshine Agenda period. *See generally* Section 1.1206(a). The Sunshine Agenda period is the period of time which commences with the release of a public notice that a matter has been placed on the Sunshine Agenda and terminates when the Commission (1) releases the text of a decision or order in the matter; (2) issues a public notice stating that the matter has been deleted from the Sunshine Agenda; or (3)issues a public notice stating that the matter has been returned to the staff for further consideration, whichever occurs first. Section 1.1202(f). During the Sunshine Agenda period, no presentations, *ex parte* or otherwise, are permitted unless specifically requested by the Commission or staff for the clarification or adduction of evidence or the resolution of issues in the proceeding. Section 1.1203.

41. In general, an *ex parte* presentation is any presentation directed to the merits or outcome of the proceeding made to decision-making personnel which (1) if written, is not served on the parties to the proceeding, or (2),if oral, is made without advance notice to the parties to the proceeding and without opportunity for them to be present. Section 1.1201(b). Any person who submits a written *ex parte* presentation must provide on the same day it is submitted a copy of same to the Commission's Secretary for inclusion in the public record. Any person who makes an oral *ex parte* presentation that presents data or arguments not already reflected in that person's previously-filed written comments, memoranda, or filings in the proceeding must provide on the day of the oral presentation a written memorandum to the Secretary (with a copy to the Commissioner or staff member involved) which summarizes the data and arguments. Each *ex parte* presentation described above must state on its face that the Secretary has been served, and must also state by docket number the proceeding to which it relates. Section 1.1206.

42. As required by Section 603 of the Regulatory Flexibility Act, the Commission has prepared an initial regulatory flexibility analysis (IRFA) of the expected impact of these proposed policies and rules on small entities.The IRFA is attached as Appendix A. Written public comments are requested on the IRFA. These comments must be filed in accordance with the same filing deadlines as comments on the rest of the *Notice*, but they must have a separate and distinct heading designating them as responses to the Regulatory Flexibility Analysis. The Secretary shall cause a copy of this *Notice of Proposed Rule Making*, including the Regulatory Flexibility Analysis, to be sent to the Chief Counsel for Advocacy of the Small Business Administration in accordance with Section 603(a) of the Regulatory Flexibility Act, Pub. L. 96-354, 94 Stat. 1164, 5 U.S.C. 601 *et seq.*, (1981).

43. The proposal contained herein has been analyzed with respect to the Paperwork Reduction Act of 1980 and found to contain no new or modified form,information collection and/or record keeping, labeling, disclosure, or record retention requirements, and will not increase burden hours imposed on the public.

44. For further information on this proceeding, contact Larry W. Olson,Mass Media Bureau, (202) 632-6955.

FEDERAL COMMUNICATIONS COMMISSION

Donna R. Searcy
Secretary

APPENDIX A

REGULATORY FLEXIBILITY ACT INITIAL ANALYSIS I.

Reason for Action: In this proceeding, we seek public comment on the desirability of replacing the existing AM broadcast skywave propagation curves with a new propa-

gation model recently developed. The new model results from recent scientific analysis of skywave measurement data that provides a better understanding of skywave propagation phenomena. Use of the new method for calculating skywave field strength in the AM service would provide a more accurate depiction of the service and interference relationships between AM stations.

II. Objective: The proposed changes are intended to modify provisions of the Rules which have been found to be inaccurate. This is in keeping with the Commission's efforts to update and improve the standards upon which the AM service is based so as to reflect the actual representation of service and interference.

III. Legal Basis: Sections 4(i), 303 and 307 of the Communications Act of 1934, as amended,47 U.S.C. §§154(i), 303, and 307.

IV. Description, Potential Impact and Number of Small Entities Affected: There are approximately 5000 AM broadcast stations in the United States. None of these stations should be affected directly by this proposal since the changes proposed only relate to the standards (curves and formulas) used to calculate skywave field strength. We expect no negative impact to these stations, small entities or large, as we are not mandating any new requirements or showings. Actual interference is not expected to increase as a result of the specific changes proposed in this *Notice*. We will, however, consider in future rule making proceedings the related questions regarding assignment principles which, together with the propagation model, may result in new definitions of service and interference for AM broadcast stations. Such definitions are not now known but are intended to be beneficial to the AM service as a whole.

V. Reporting Record Keeping, and other Compliance requirements: There is no additional impact.

VI. Federal Rules that Overlap, Duplicate or Conflict with These Rules: There is no overlap, duplication, or conflict.

VII. Any Significant Alternatives Minimizing Impact on Small Entities and Consistent with Stated Objectives: There are no significant alternatives available.

FOOTNOTES

[1] The *Inquiry* was issued after review of the comments received in response to the Mass Media Bureau's *Report on the Status of the AM Broadcast Rules*, RM-5532, *(Report)* released April 3, 1986. The *Report* discussed the status of AM broadcasting and addressed a large number of technical, legal, and policy issues.

[2] By *Order*, DA 87-1823, released December 15, 1987, the Commission granted a "Motion for Extension of Time for Filing Comments and Reply Comments" submitted by the National Association of Broadcasters (NAB). Inthat *Order*, the Commission bifurcated the proceeding and established separate filing periods. Phase 1 involved Sections II and III of the *Inquiry* whilePhase 2 involved Sections I and IV. For the specific issues raised in Section III (Related Technical Issues) of the *Inquiry* under which skywave propagation falls, the time for filing comments and replies was extended to February 1,1988 and March 1, 1988, respectively.

[3] This proceeding will examine only those issues pertaining to skywave propagation. Where appropriate, the Commission will institute future rulemaking proceedings to deal with the remaining issues addressed in the *Inquiry* and public comments. For example, in a similar action today, the Commissionin stituted a proceeding concerning groundwave propagation. *See* , *Notice of Proposed Rule Making*, MM Docket No. 88-510, FCC 88-326.

[4] The ionosphere is a region of the earth's atmosphere consisting of several layers subject to ionization. These layers are alphabetically designated and have varying effects on radio waves. Pertinent to the propagation of AM broadcast signals are three ionization layers (D, E, and F). The distance of these layers above the earth varies from approximately 50 km for the D-layer (nearest the earth) to approximately 300 km for the F-layer (farthest from the earth).

[5] A version of Figure 1a was adopted by the Region 2 Administrative Radio Conference, Rio de Janeiro, 1981.

[6] Figure 1b is an interim curve adopted for use pending completion of further analysis of field strength measurement data subsequently collected. *See* , *Report and Order* in MM Docket No.83-807, 49 FR 43957, November 1, 1984.

[7] The occurance of sunspots on the surface of the sun rises and falls in a periodic relationship over an eleven year cycle. Each year in the cycle is assigned a sunspot number which is proportional to the solar activity of the sun for that given year.

[8] Observations indicate that skywave field strengths increase as the sunspot number decreases.

[9] Field Strength recordings were made on more than 40 paths ranging from 165 to 4176 km with transmitting frequencies ranging from 540 to 1530 kHz. The midpoint geomagnetic latitudes of these paths are between 40 and 54 degrees North. Figure 2 differs from Figure 1a in one major respect by giving weight to the effects of geographic latitude and depicts a family of curves ranging from 36 degrees to 50 degrees geographic latitude.

[10] The high-latitude field strength measurement program has been completed and the results are expected to be published later this year.

[11] There are two latitude terms which apply to this discussion. The first, geographic latitude, refers to a physical location of a point on the surface of the earth relative to the north and south poles. The second, geomagnetic latitude, takes into account the effects of the earth's magnetic influence on radio waves and is based on the magnetic poles. Geomagnetic coordinates are similar but not identical to geographic coordinates. The geomagnetic northpole is located at 78.5 degrees North and 69 degrees West. Geophysical phenomena, including absorption of electro magnetic waves, are better related to geomagnetic latitudes.

[12] Slant distance is the total distance that a skywave signal travels along a propagation path including the distance traveled to and from the E layer of the ionosphere.

[13] The FCC Rules specify that the skywave service areas of Class I stations are to be calculated using skywave field strength exceeded 50% of the time, whereas, interfering skywave signals are computed using skywave field strength exceeded 10% of the time.

[14] In preparation for the Region 2 Administrative Radio Conference for the band 1605-1705 kHz, the Commission's staff developed the "modified method".It was adopted by that Conference as a recommended method for calculating interregional interference. *See* , "A Skywave Propagation Study in Preparation for the 1605-1705 kHz Broadcasting Conference" by J. Wang, *IEEE Transactions on Broadcasting*, Vol. BC-31, No. 1, pp. 10-17, March 1985.

[15] At one time the calculation of service contours using such a procedure was laborious, but the current wide-spread availability of computers facilitates such calculations.

[16] Parties who believe that curves should be included in the FCC Rules should provide practical reasons for that position. It is our preliminary view that parties could individually prepare curves for their own use if such convenience is desirable.

[17] It was noted in the *Inquiry* that the slant distance changed little forgreat-circle distances less than 200 km.

[18] Currently, Figures 1a and 2 of Section 73.190 of the FCC Rules contain a gap in the range of 0-100 km where no skywave field strength values are provided. Occasionally, there is a need to compute field strength for such short paths and no method is specified in the FCC Rules.

[19] The Consultative Committee on International Radio (CCIR) is a technical body of the International TelecommunicationUnion within which administrations from around the world contribute and exchange technical information. The CCIR develops recommendations based upon this broad base of data and information on issues where technical advances have been achieved.

[20] *See* , "Prediction of MF Skywave Field Strength in North America", *IEEE Transactions on Broadcasting*, Vol. BC-23, No. 2, pp. 43-49, June 1977.

[21] *See* , FCC Technical Memorandum OST TM83-4.

[22] As an example, consider the propagation path for WLW, Cincinnati, OH to Portland, OR (700 kHz, 3192 km, 53 degrees North geomagnetic latitude). During Sunspot Cycle 18, as the sunspot number increased from its minimum to maximum, field strength for SS+2 decreased by 16.9 dB, that for SS+4 decreased by 13.3 dB, and that for SS+6 decreased by only 7.3 dB.

[23] The populated areas of the United States cover a wide range of geomagnetic latitudes: Honolulu, 19.5 degrees North; Virgin Islands, 30 degrees North; Fairbanks, 64 degrees North.

[24] A 13 dB factor had been previously adopted by the FCC for use with Figure 1b of the Rules when stations in Alaska are involved in calculations. We now believe that it would be more appropriate to use a 10 dB factor in conjunction with the "modified method" where stations in Alaska are concerned.

[25] The results of these calculations are contained in Appendix C of this *Notice*. RSS (root-sum-square) calculations for three regional channels have been included as well as two examples of the skywave service provided by Class I stations at high-latitudes and low-latitudes.

[26] A true comparison between current calculation procedures and those proposed in this *Notice* are possible only at SS+2 because current procedures are based upon that reference hour.

[27] A related issue concerns those situations where the new skywave calculation procedures and any related technical changes to the Commission's Rules result in received levels of interference less than that permitted for the normally protected contour.

APPENDIX B - CALCULATION OF SKYWAVE FIELD STRENGTH

The following formulas are proposed to be used in place of the curves in Section 73.190 of the FCC Rules. The methods used to determine other factors such as radiation value, elevation angle, and $f(\theta)$ are unchanged and can be determined by referring to the appropriate section of the FCC Rules.

1. Skywave field strength, 50% of the time (at SS+6):

The skywave field strength, $F_s(50)$, for a characteristic field strength of 100 mV/m at 1 km is given by:

$$F_s(50) = (97.5 - 20\log D) - (2\pi + 4.95\tan^2\theta_M)\sqrt{(D/1000)} \quad \text{dB}(\mu\text{V/m}) \tag{1}$$

The slant distance, D, is given by:

$$D = \sqrt{40{,}000 - d^2} \quad \text{km} \tag{2}$$

The geomagnetic latitude of the midpoint of the path, θ_M, is given by:

$$\theta_M = \arcsin[\sin a_M \sin 78.5^\circ - \cos a_M \cos 78.5^\circ \cos(69 - b_M)] \quad \text{degrees} \tag{3}$$

The short great-circle path distance, d, is given by:

$$d = 111.18 d^\circ \quad \text{km} \tag{4}$$

Where:

$$d^\circ = \arccos[\sin a_T \sin a_R + \cos a_T \cos a_R \cos(b_R - b_T)] \quad \text{degrees} \tag{5}$$

Where:
a_T is the geographic latitude of the transmitting terminal (degrees)
a_R is the geographic latitude of the receiving terminal (degrees)
b_T is the geographic longitude of the transmitting terminal (degrees)
b_R is the geographic longitude of the receiving terminal (degrees)
a_M is the geographic latitude of the midpoint of the great-circle path and is given by:

$$a_M = 90 - \arccos\left[\sin a_R \cos\left(\frac{d^\circ}{2}\right) - \cos a_R \sin\left(\frac{d^\circ}{2}\right)\left\{\frac{\sin a_T - \sin a_R \cos d^\circ}{\cos a_R \sin d^\circ}\right\}\right] \quad \text{degrees} \tag{6}$$

b_M is the geographic longitude of the midpoint of the great-circle path and is given by:

$$b_M = b_R + k\left[\arccos\left(\frac{\cos(\frac{d^\circ}{2}) - \sin a_R \sin a_M}{\cos a_R \cos a_M}\right)\right] \quad \text{degrees} \tag{7}$$

Note(1): If $|\theta_M|$ is greater than 60 degrees, equation (1) is evaluated for $|\theta_M| = 60$ degrees.
Note(2): North and east are considered positive; south and west negative.
Note(3): In equation (7), $k = -1$ if $b_R > b_T$, otherwise $k = 1$.

2. Skywave field strength, 10% of the time (at SS+6):

The skywave field strength, $F_s(10)$, is given by:

$$F_s(10) = F_s(50) + \Delta \quad \text{dB}(\mu\text{V/m}) \tag{8}$$

Where:
$\Delta = 6$ when $|\theta_M| < 40$
$\Delta = 0.2|\theta_M| - 2$ when $40 \le |\theta_M| \le 60$
$\Delta = 10$ when $|\theta_M| > 60$

APPENDIX C

COMPARISON OF SKYWAVE FIELD STRENGTH CALCULATIONS

FREQUENCY: 560 KHZ

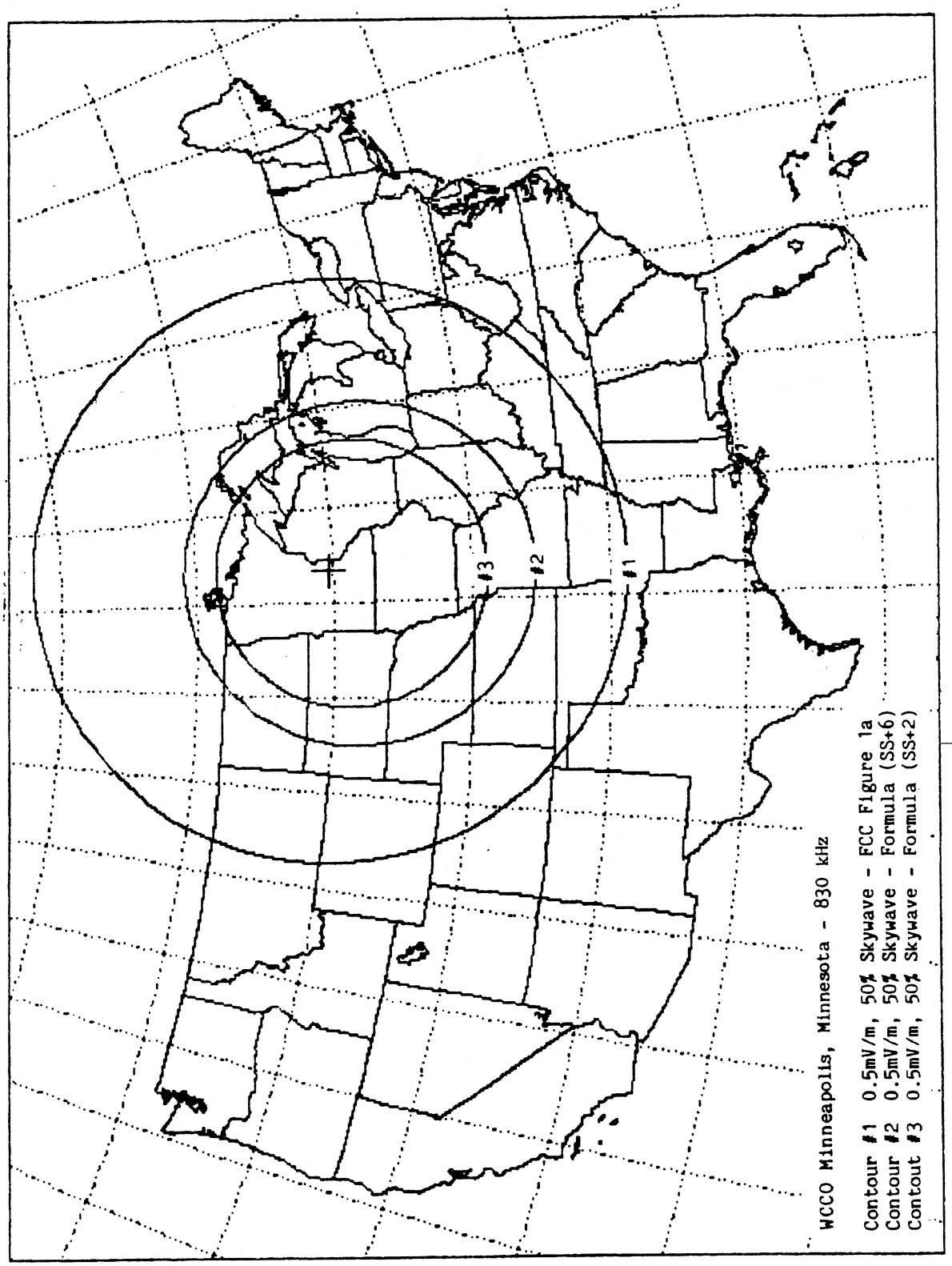
	VALUE OF RSS (MV/M)		
	FCC	MODIFIED METHOD	
CALL SIGN	FIGURE 2	SS+2	SS+6
KVOK	0.77	0.69	0.92
KBLU	6.23	4.88	6.51
KSFO	1.89	1.52	2.03
KLZ	2.41	1.71	2.28
WQAM	2.96	2.23	2.97
WIND	3.24	1.99	2.66
WHYN	4.21	4.14	5.52
WGAN	3.31	2.02	2.70
WEBC	28.38	15.47	20.63
KWTO	7.08	4.83	6.44
KMON	8.08	4.10	5.46
WGAI	18.05	14.70	19.60
WFIL	4.19	2.19	2.92
WVOC	4.66	2.74	3.65
WHBQ	9.77	6.50	8.67
KLVI	3.72	2.66	3.55
KPQ	2.83	1.61	2.15
WJLS	11.04	9.69	12.92

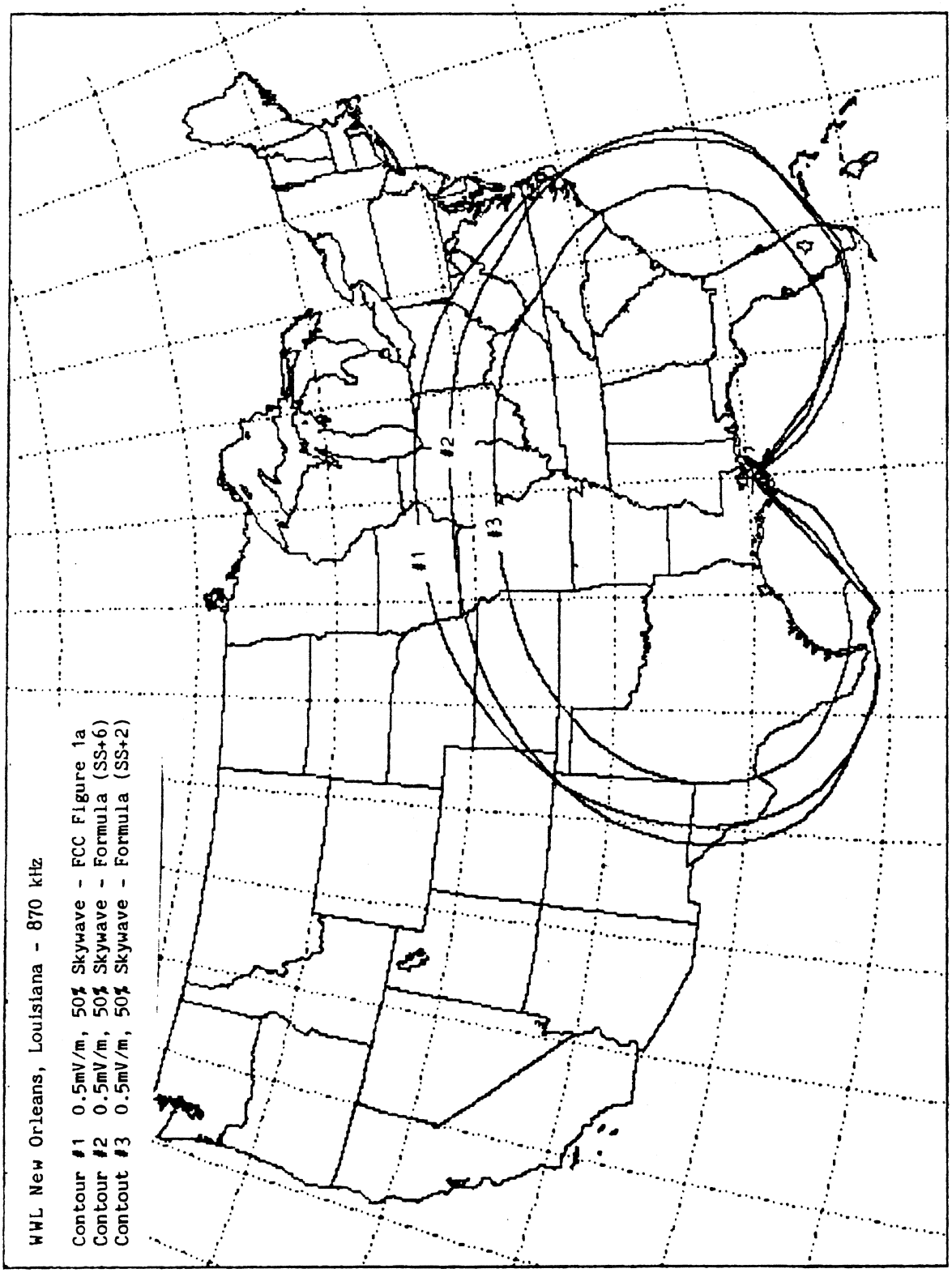
FREQUENCY: 980 KHZ

CALL SIGN	VALUE OF RSS (MV/M)		
	FCC	MODIFIED METHOD	
	FIGURE 2	SS+2	SS+6
KENY	2.11	1.85	2.47
KINS	11.13	6.83	9.10
KFWB	3.50	2.80	3.74
KGLN	14.11	10.50	14.00
WWRC	3.65	2.64	3.51
WFXP	15.76	11.59	15.46
WTOT	12.88	9.05	12.07
WWNN	5.78	4.45	5.94
WPGA	17.57	13.11	17.49
WGVT	21.06	23.70	31.61
KUPI	14.05	7.75	10.33
KSGM	9.98	8.90	11.86
WITY	18.60	16.46	21.95
WCAP	37.12	35.82	47.76
WAYL	17.50	10.71	14.28
KMBZ	2.81	2.00	2.67
WAAV	22.12	17.23	22.97
KICA	14.27	8.71	11.62
WJIW	11.00	11.84	15.78
WTRY	6.57	5.59	7.45
WONE	10.59	7.62	10.16
WILK	8.13	8.40	11.20
WBZK	24.66	21.90	29.20
KDSJ	14.59	7.81	10.42
WSIX	9.98	6.85	9.13
KSVC	14.76	10.41	13.88
WFHG	18.86	15.29	20.39
KUTI	14.83	14.45	19.27
WCUB	33.13	21.68	28.91

FREQUENCY: 1590 KHZ

CALL SIGN	VALUE OF RSS (MV/M)		
	FCC	MODIFIED METHOD	
	FIGURE 2	SS+2	SS+6
WGYJ	17.27	15.98	21.30
WVNA	5.45	4.36	5.81
KYDE	6.81	5.24	6.99
KSSU	11.31	8.28	11.04
KLIV	4.32	3.33	4.44
KOGO	7.41	7.05	9.40
WQQW	2.32	2.12	2.83
WRXB	12.05	9.89	13.19
WALG	2.83	2.65	3.53
KWBG	11.63	6.89	9.19
WONX	14.30	13.76	18.34
WNTS	8.93	8.36	11.15
KVGB	3.24	3.15	4.20
WJRO	14.95	11.55	15.40
WETT	19.72	17.16	22.88
WJBQ	26.33	31.66	42.22
WTVB	15.24	14.45	19.27
KCNN	13.17	6.49	8.65
WZRX	8.63	7.66	10.22
WSMN	15.61	17.84	23.79
WERA	12.46	14.90	19.87
WAUB	25.29	21.35	28.47
WASB	28.79	24.24	32.32
WEHH	19.53	17.08	22.78
WAKR	2.31	1.69	2.25
KTIL	5.96	4.75	6.34
WCBG	13.36	12.13	16.18
WCZN	12.77	12.07	16.09
WXRF	2.13	2.72	3.63
WARV	15.48	19.08	25.44
WUSJ	5.94	4.36	5.81
KYOK	7.83	6.20	8.27
KEND	4.95	4.44	5.93
KDAE	11.46	10.38	13.84
KMTI	13.40	8.29	11.05
KJET	4.19	3.63	4.84
WTOQ	11.97	8.90	11.87
WTRW	28.62	25.08	33.45


#3
#2
#1
WCCO Minneapolis, Minnesota - 830 kHz
Contour #1 0.5mV/m, 50% Skywave - FCC Figure 1a
Contour #2 0.5mV/m, 50% Skywave - Formula (SS+6)
Contout #3 0.5mV/m, 50% Skywave - Formula (SS+2)


WWL New Orleans, Louisiana - 870 kHz
Contour #1 0.5mV/m, 50% Skywave - FCC Figure 1a
Contour #2 0.5mV/m, 50% Skywave - Formula (SS+6)
Contout #3 0.5mV/m, 50% Skywave - Formula (SS+2)
#1
#2
#3

Before the
Federal Communications Commission
Washington, D.C. 20554

MM Docket No. 88-509

In the Matter of

Enhanced Nighttime Operation
for Class II-S and Class III-S
AM Radio Broadcast Stations

NOTICE OF PROPOSED RULE MAKING

Adopted: October 13, 1988; Released: November 4, 1988

By the Commission:

INTRODUCTION

1. The Commission is initiating this *Notice of Proposed Rule Making* (*Notice*) to consider changes in the rules to facilitate the enhancement of nighttime operations by Class II-S and Class III-S AM stations. The proposed rules would allow these stations to establish a separate nighttime antenna system without having to meet the minimum power, city coverage or minimum operating schedule requirements that otherwise would apply to such a change in their nighttime operations.

2. This *Notice* is part of the Commission's continuing efforts to create an environment in which AM stations can compete effectively and thereby better serve the public. To a considerable degree, recent actions involving AM stations have been based on the Mass Media Bureau's *Report on the Status of the AM Broadcast Rules*, RM-5532, released April 3, 1986 (*Report*), and the comments received in response to it. The *Report* addressed a large number of technical, legal and policy issues, seeking to identify opportunities to change or eliminate existing rules in order to assist AM broadcasters in meeting the competitive challenges facing them, thereby improving their service to the public. Recognizing that daytime-only stations face serious disadvantages because of their inability to operate at night, the Commission has implemented a number of proceedings to remove this limitation to the maximum extent possible consistent with sound engineering practice. For example, actions taken in a series of proceedings have allowed many daytime- only stations to become full-time stations. Nonetheless, we are of the view that it may be possible to take further steps to enhance the opportunity for former daytime-only stations to improve their nighttime operations while at the same time maintaining existing interference protection requirements. Before discussing the specific proposal, however, we will provide some background information regarding the various actions taken by the Commission in this area in recent years.

BACKGROUND

3. The current proposal can be seen as a continuation of the rule making process that began with the Commission's 1983 action first authorizing post- sunset operation by daytime-only stations.[1] Although many daytime-only stations had been able to conduct pre-sunrise operations (typically beginning at 6:00 a.m. local time), similar relief had not been available for the post- sunset period because of international agreements then in effect.[2] However, with the implementation of new AM agreements with Canada and Mexico, the FCC was able to authorize post-sunset operation. Under the rules adopted by the Commission, the great majority of daytime-only stations have been permitted to operate for up to two hours beyond local sunset with a power of 0.5 kW, reduced as necessary to avoid interference. A special computer program was created by the Commission to do the calculations involved and to issue the authorizations.

4. Although these actions brought important benefits, it was clear that pre-sunrise and post-sunset operation alone could not be expected to alleviate all of the difficulties faced by daytime-only stations. This led the Commission to study other possible relief, in particular the possibility of authorizing regular licensed nighttime operation with allowable powers calculated in much the same way as the post-sunset powers had been, using a computer program devised by the Commission. Studies established the feasibility of such a step, and in MM Docket No. 84-281 the Commission authorized nighttime operation by almost all of the daytime-only stations on what had previously been 14 foreign Class I-A clear channels.[3]

5. Nighttime operation on the foreign clear channels is being initiated in stages. During the first five-year period of such operation, the Commission has authorized a maximum power of 0.5 kW, reduced as necessary to protect existing foreign and domestic full-time stations on these channels. The power to be used is based on the station's daytime (or, if applicable, the station's critical hours)[4] antenna system. Because in many cases the initial powers were quite low, the Commission encouraged these stations to take other steps, typically through the installation of directional antennas, that would permit them to employ higher powers. Stations taking advantage of this opportunity had to propose a minimum power of 0.25 kW or its equivalent.[5] In allowing these increases in power, we stated that these stations would not be required to provide interference protection to one another during the initial five-year period of nighttime operation. However, after the five-year initial period, protection would have to be afforded to all stations, including former daytime-only stations, operating at night with at least minimum power.[6] Also, subject to this limitation on interference, the permissible power for these stations will increase to 1 kW.

6. Then, in MM Docket 87-131, the Commission took a similar step and allowed qualifying daytime-only Class III stations on the regional channels (and Class II daytime-only stations on two clear channels on which no U.S. clear channel stations operate) to operate at night using their existing antenna system with a maximum power of 0.5 kW, reduced as necessary to avoid interference to existing full-time stations. Stations authorized a power of at least 0.25 kW (or equivalent) were reclassified as unlimited-time Class II or Class III stations.[7] Others receiving lesser powers were reclassified as Class II-S or Class III-S stations[8] and were exempted from the principal city signal requirement. The Commission also exempted the new

Class II-S and Class III-S stations from the requirement that unlimited-time stations operate two- thirds of the hours between 6:00 p.m. and midnight each day of the week except Sunday.

7. These various Commission actions have substantially relieved the difficulties faced by daytime-only stations and their listeners, but as discussed below, we believe that there may be additional steps that can be taken to enable these former daytime-only stations to better serve their communities.[9]

DISCUSSION

Enhanced Nighttime Operation

8. In our actions permitting daytime-only stations to operate at night, the power levels authorized were calculated based on the same antenna system that the station used to provide its daytime (or, if applicable, its critical hours) service. Since these antenna systems had been designed with only daytime protection in mind, in many cases they were not capable of providing effective nighttime service. Many in this group were restricted to low powers from sites at some distance from the population to be served. This led some to decide not to use the authorization because the station's daytime site was not close enough to the community of license to permit it to be served with the authorized nighttime power and existing antenna pattern.

9. Although a Class II-S or III-S station was permitted to seek an increase in power, it had to propose an increase to at least the minimum power level. For some affected stations, we have found that such an increase is not possible at all for interference reasons; for others, it can be accomplished only at a prohibitive cost by installing highly directionalized antennas. Moreover, because of the low power initially authorized, some stations have chosen not to take advantage of their authorizations. In other cases, stations that do operate at night are unable to obtain the coverage they desire. No relief is available unless the station is able to propose an increase to at least the minimum power level. In many cases, this situation would change if the stations were able to establish a separate nighttime antenna system, either at the current site or elsewhere, from which the desired service could be provided without having to meet the minimum power requirement. It appears as if both the station and the public could benefit if the station had this latitude in selecting a site and antenna system responsive to its needs.

10. Continuing to restrict power increases to only those stations able to achieve minimum power may well be contrary to the public interest because such action could have the practical effect of preventing many Class II-S or III-S stations from upgrading their facilities at all. Stations able to increase power to the specified minimum level already have good reasons to do so, not only by virtue of the increase in coverage it makes possible but through the interference protection that they will obtain if they reach the level of minimum power. For stations not in this fortunate position, there is no current relief available. Even if these stations are unable to reach the minimum power level, we question whether the public is served by denying them the opportunity to improve their facilities and enhance their coverage. We recognize that permitting stations to apply for lesser power increases may diminish somewhat the incentive to reach minimum power. Our experience indicates, however, that it has been practical limitations such as financial or technical considerations that have kept many Class II-S and III-S licensees from operating with minimum power. Because these licensees are thus unlikely to reach minimum power in any case, there appears to be no basis for refusing to allow such stations the opportunity to provide increased service, albeit at less than minimum power.

11. For these r asons, we propose to allow Class II-S and III-S stations to establish separate nighttime operations, utilizing either their daytime operating site or another site, at power levels below the 0.25 kW minimum.[10] This proposal can offer several advantages. It would permit the licensee to consider a wide range of choices of how best to operate at night. The licensee could install a directional antenna designed specifically for nighttime operation, either at its current site or elsewhere. It could operate non-directionally from another site closer to the community of license or it could increase power, albeit not to the minimum power level. Even if the power were not increased or in fact was marginally reduced, coverage still could be improved in the very areas where it may most be needed, thus improving service to the public.[11] In addition, this approach could also offer the licensee the opportunity to use a simple nondirectional antenna array from its existing site or from another site that would enable the licensee to provide satisfactory nighttime service and thus compete more effectively in its market.[12]

12. It is important to take into account the administrative impact that adoption of this proposal might entail. To lessen any such impact, it may be possible to simplify or streamline the application process. One possibility is to define all such proposals as minor change applications even if a power increase is involved, thus eliminating the public notice requirements and reducing processing time. Comment on this and other possible approaches to lessening the administrative impact is invited.

13. Finally, we wish to make an important observation with respect to processing procedures applicable to Class II-S and III-S licensees filing applications for modifications of facilities. Initially, the Commission calculated the permissible powers and issued the appropriate nighttime authorizations. The calculations were based upon the daytime or critical hours antenna system. In the past, AM licensees seeking a change in authorization for their daytime facilities did not recognize the need to file for any corresponding change this necessitated in their nighttime facilities. In the future, however, it will be necessary for Class II-S and III-S licensees seeking authorization for modifications to their daytime facilities that would require any change to their nighttime operations to include information specifying the requisite changes to nighttime operations in their application. We note that, in the context of this proceeding, if Class II-S or III-S licensees use separate facilities for daytime and nighttime operations, changes in daytime operations will not necessarily in such cases affect nighttime operation. In such cases, this additional information would not be required.

Relaxation of Power Minimum

14. In addition, some full-time stations have expressed an interest in operating at lower nighttime powers but are currently barred from doing so by the minimum power and city coverage requirements. We seek comments upon permitting such a voluntary power reduction. Allowing stations to reduce power to a level below the current

minimum could provide licensees with additional latitude in which to tailor their facilities to respond to existing market conditions. Greater flexibility could result in services better attuned to meeting the needs of the station's audience. Should we proceed in this fashion, we intend to maintain the interference constraints applicable to such stations. We propose, however, that a station reducing its power to a level below the established minimum would be reclassified as Class II-S or Class III-S and would lose its right to interference protection that is accorded to stations with at least minimum facilities. It is our intention at this time to retain the city coverage and minimum operating schedule requirements for stations employing voluntary power reductions. We seek comment upon whether it would be appropriate to exempt such stations from these requirements, as are existing Class II-S and III-S stations, or whether stations engaging in a voluntary power reduction below the minimum level should continue to be held to the city coverage or minimum operating schedule requirements.

ADMINISTRATIVE MATTERS

15. Authority for the rule changes upon which comments are invited is contained in Sections 4(i), 303, and 307 of the Communications Act of 1934, as amended, 47 U.S.C. 154(i), 303, and 307.

16. Pursuant to the applicable procedures set forth in 1.415 and 1.419 of the Commission's Rules, interested parties may file comments on or before **December 27, 1988,** and reply comments on or before **January 11, 1989.** All relevant and timely comments will be considered by the Commission before final action is taken in this proceeding. To file formally in this proceeding, participants must file an original and five copies of all comments, reply comments, and supporting comments. If participants want each Commissioner to receive personal copies of their comments, an original plus nine copies must be filed. Comments and reply comments should be sent to Office of the Secretary, Federal Communications Commission, 1919 M Street, N.W., Washington, D.C. 20554. Comments and reply comments will be available for public inspection during regular business hours in the Dockets Reference Room (Room 239) of the Federal Communications Commission, 1919 M Street, N.W., Washington, D.C. 20554.

17. For the purposes of this non-restricted notice and comment rule making proceeding, members of the public are advised that *ex parte* contacts are permitted except during the Sunshine Agenda period. *See generally* Section 1.1206(a). The Sunshine Agenda period is the period of time which commences with the release of a public notice stating that a matter has been placed on the Sunshine Agenda and terminates when the Commission (1) releases the text of a decision or order in the matter; (2) issues a public notice stating that the matter has been deleted from the Sunshine Agenda; or (3) issues a public notice stating that the matter has been returned to the staff for further consideration, whichever comes first. Section 1.1202(f). During the Sunshine Agenda period, no presentations, *ex parte* or otherwise, are permitted unless specifically requested by the Commission or staff for the clarification or adduction of evidence for the resolution of issues in the proceeding. Section 1.1203.

18. In general, an *ex parte* presentation is any presentation directed to the merits or outcome of the proceeding made to decision-making personnel which (1) if written, is not served on the parties to the proceeding, or (2), if oral, is made without advance notice to the parties to the proceeding and without opportunity for them to be present. Section 1.1201(b). Any person who submits a written *ex parte* presentation must provide on the same day it is submitted a copy of same to the Commission's Secretary for inclusion in the public record. Any person who makes an oral *ex parte* presentation that presents data or arguments not already reflected in that person's previously- filed written comments, memoranda, or filings in the proceeding must provide on the day of the oral presentation a written memorandum to the Secretary (with a copy to the Commissioner or staff member involved) which summarizes the data and arguments. Each *ex parte* presentation described above must state on its face that the Secretary has been served, and must also state by docket number the proceeding to which it relates. Section 1.1206.

19. As required by Section 603 of the Regulatory Flexibility Act, the Commission has prepared an initial regulatory flexibility analysis (IRFA) of the expected impact of these proposed policies and rules on small entities. The IRFA is attached as Appendix A. Written public comments are requested on the IRFA. These comments must be filed in accordance with the same filing deadlines as comments on the rest of the *Notice*, but they must have a separate and distinct heading designating them as responses to the Regulatory Flexibility Analysis. The Secretary shall cause a copy of this *Notice of Proposed Rule Making*, including the Regulatory Flexibility Analysis, to be sent to the Chief Counsel for Advocacy of the Small Business Administration in accordance with section 603(a) of the Regulatory Flexibility Act, Pub.L. 96- 354, 94 Stat. 1164, 5 U.S.C. 601 *et seq.*,(1981).

20. The proposal herein has been analyzed with respect to the Paperwork Reduction Act of 1980 and found to contain no new or modified form, information collection and/or recordkeeping, labeling, disclosure, or record retention requirements, and will not increase burden hours imposed upon the public.

21. For further information on this proceeding, contact Diane L. Hofbauer, (202) 254-3394.

FEDERAL COMMUNICATIONS COMMISSION

Donna R. Searcy
Secretary

APPENDIX A

REGULATORY FLEXIBILITY ACT INITIAL ANALYSIS

I. Reason for Action:

In this proceeding, we seek public comment upon a proposal to allow Class II-S and Class III-S AM broadcast stations to establish separate nighttime operations designed to better serve local needs without requiring them to comply with minimum power requirements.

II. Objective:

This proposal is intended to permit an expansion of the nighttime operations of Class II-S and III-S AM stations so that they may better serve the public.

III. Legal Basis:

Sections 4(i), 303, and 307 of the Communications Act, as amended, 47 U.S.C. §§154(i), 303 and 307.

IV. Description, Potential Impact, and Number of Small Entities Affected:

There are more than 1500 AM broadcast stations that could benefit from this proposal in the United States. An estimated 50 AM licensees per year are expected to utilize the options proposed in this Notice of Proposed Rule Making. This proposal is expected to increase service to local communities with minimal additional, if any, expense to the licensee.

V. Reporting, Record Keeping, and Other Compliance Requirements :

There are no reporting, record keeping or other compliance requirements.

VI. Federal Rules that Overlap, Duplicate or Conflict with Proposal:

There is no overlap, duplication or conflict.

VII. Any Significant Alternatives Minimizing Impact on Small Entities and Consistent with Stated Objective:

This proposal is designed specifically to allow AM licensees to increase service with little or no impact on current operations.

FOOTNOTES

[1] Hours of Operation of Daytime-Only Stations, *First Report and Order* in BC Docket No. 82-538, 95 FCC 2d 1032 (1983).

[2] A discussion of this situation is contained in the *First* Report and Order in BC Docket No. 82-538, supra, at Paragraphs 51-52.

[3] See Report and Order adopted April 26, 1985 in MM Docket No. 84-281, FCC 85-244, 50 Fed. Reg. 24515, June 11, 1985, as modified on reconsideration, Memorandum Opinion and Order, adopted February 3, 1986, FCC 86-79, 103 FCC 2d 532 (1986).

[4] Critical hours are the first two hours after sunrise and the last two hours before sunset during which there is a potential for daytime skywave interference.

[5] For the sake of convenience, we refer to a minimum power of 0.25 kW. Operating with this power and minimum antenna efficiency, a station has an RMS of 141 mV/m at one kilometer. Thus, any operation with an RMS of 141 mV/m or greater meets the minimum even though the power may be below 0.25 kW. This occurs when an antenna system of greater efficiency is employed.

[6] The principle reason for imposition of minimum power requirements is the recognition that operations with a power below this level are likely to cause a disproportionate degree of preclusion in exchange for the service that will be provided. The same concerns, however, may not hold true in a mature medium like AM where the areas of such preclusion are likely to have been precluded already.

[7] In connection with this action, the Commission reduced the generally applicable minimum power for nighttime operation of Class III stations on regional channels to 0.25 kW.

[8] Class III-S stations are full-time stations on regional channels operating below minimum power at night. Class II-S stations operate on a like basis on clear channels.

[9] When the Commission began its actions, there were more than 2,400 authorized daytime-only stations representing about half of the total of AM stations. As a result of the recent actions, more than three quarters of these stations have been authorized to operate at night. As discussed below, not all of these stations have chosen to implement nighttime operation.

[10] When the Commission authorized nighttime operation with less than the minimum power, it recognized that it would be unrealistic to expect the station to provide the city coverage required at night. Although adoption of the proposal now before us could lead to some increase in nighttime city coverage, it appears that it likewise would serve little purpose to apply the principal city signal requirement to the nighttime operation of these stations. The same is true for the minimum operating schedule requirement. The current rules exempt Class II-S and III-S stations from both requirements, and we propose to continue these exemptions. Exemption from the principal city signal requirement, however, creates the possibility that a station could establish nighttime service in a new community at the expense of service to its community of license. This outcome could be avoided if we required nighttime service levels within the community of license to be at least as good as the service levels originally authorized (i.e. that originally authorized by the Commission for nighttime operation using daytime facilities). We seek comment as to whether this or some similar requirement is necessary. Finally, we do not hereby contemplate any changes in any daytimer preferences that these Class II-S and III-S stations might enjoy.

[11] In making this proposal, we have no intention of authorizing facilities that would be predicted to create interference to full-time stations under the criteria established in §73.37(a) of our Rules.

[12] Although problems with re-radiation and with antenna efficiency have in the past been associated with the use of rooftop antennas for nighttime operations, we are willing to consider whether utilization of rooftop antennas could provide a feasible alternative. We invite comment on this alternative and may consider whether to allow use of roof-top antennas should the commenters demonstrate that rooftop antennas are feasible and could be utilized without causing undue re-radiation concerns.