

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

REPORT AND ORDER
(Proceeding Terminated)

Adopted: April 12, 1990;

Released: July 18, 1990

By the Commission:

INTRODUCTION

1. On October 13, 1988, the Commission adopted a *Notice of Proposed Rule Making* ("Notice") in this proceeding, 3 FCC Rcd 6431 (1988), which proposed to adopt a new method of computing skywave signal strength in the AM Broadcast Service. This new skywave model would replace three sets of propagation curves (Figures 1a, 1b and 2 in §73.190) with more accurate equations that take into account the effects of the geomagnetic latitude of the propagation paths. The new model also proposed to use "slant distance" in lieu of the traditional "great circle distance" in making calculations. We also proposed that the new model be based on propagation conditions measured six hours after sunset ("SS+6") rather than two hours after sunset ("SS+2"). Lastly, because the new model yields results for 50% skywave field strength used in determining service contours, we proposed a geomagnetic latitude-based conversion factor for the 10% skywave signals used in predicting interference. With very few exceptions, the comments and reply comments filed in response to the *Notice* strongly supported the new skywave model and its underlying assumptions.¹ We now adopt the model essentially as proposed.

BACKGROUND

2. This proceeding is one of several AM improvement proceedings initiated in response to the MM Docket No. 87-267 *Notice of Inquiry* ("Inquiry"). 2 FCC Rcd 5014 (1987), which undertook a comprehensive review of AM broadcast assignment criteria and other technical standards. The *Inquiry* was begun in response to comments filed on the 1986 Mass Media Bureau Report on the Status of the AM Broadcast Rules (RM-5532), which discussed a number of AM broadcast technical, legal and policy issues. Extensive participation in that *Inquiry* and in the Region 2 Administrative Radio Conference by AM broadcasters, their consulting engineers and industry representatives has produced a general consensus about many of the new technical approaches needed for AM

improvement, including the so-called "modified method" of calculating skywave field strength that, with minor revisions, is the heart of this proceeding.

3. Two of the skywave propagation curves set forth in the rules were empirically derived from observations of AM band propagation phenomena completed in 1935 (for Figure 1a) and 1944 (for figure 2). However, the Commission has continued to observe AM propagation phenomena in the ensuing decades and has been able to use its experience to develop a more accurate skywave signal prediction model. For example, we have learned that skywave signal strengths are more consistent when observed six hours after sunset rather than two. Also, skywave signal strength is reduced as the geomagnetic latitude of the signal path moves north. We have also learned that using the slant distance for a propagation path, rather than the great-circle path distance results in greater accuracy, particularly when the reception point is close to the transmitter. In short, years of additional observations and measurements have revealed deficiencies in the traditional skywave propagation curves that can no longer be tolerated if AM interference is to be reduced significantly as part of our AM improvement effort.

4. Thus, the *Notice* proposed a new skywave model based on the "modified method." Its use will serve the public interest because it is more accurate than the current propagation curves and because it is easily implemented on computers. Thus, its use will avoid disputes that may arise as a result of graphical interpretation of curve data. The enthusiastic support for the new model that was expressed in the comments and reply comments derives from the fact that the "modified method" has been given careful and widespread engineering scrutiny.

DISCUSSION

General comments on the new skywave model

5. General support for the new model was unanimous. Some commenters did, however, express concerns about unintended or potentially harmful effects that could result from its adoption.

6. For example, several commenters noted that the new model would depict smaller service areas than are now predicted for clear-channel stations in northern latitudes. 3-D Communications Corporation argued that because of the protection afforded to non-existent Class I station skywave service (i.e., the service area predicted to exist using the current propagation curves minus the service area calculated with the new model), Class II stations operating on clear channel frequencies are being deprived of the ability to serve their immediate areas during the heaviest nighttime listening period. The comments of Class II Station WJAG reflect a similar opinion. E. Harold Munn, Jr. & Associates, Inc. and R. Morgan Burrow, Jr. (both professional consulting engineers) indicate that there is no justification for protecting "fictional" (Munn) or "lost area" (Burrow) domestic service when it is actually receiving interference from foreign stations.

7. These opinions are countered by comments of Class I (clear channel) licensees, who argue that current skywave service areas, even if providing weaker signals than was formerly believed, should be protected. The Clear Channel Broadcasting Service ("CCBS") argues that clear channel stations provide the only nighttime service to over one-half the land area of the United States and offer

much needed diversity within the AM band in those areas which have only one or two interference-free groundwave services at night. Thus, the CCBS concludes that during the night, clear channel stations anchor the AM band by making available a service unique to AM. The Jefferson Pilot Broadcasting Co. urges the Commission not to impair nighttime skywave service for modest gains in groundwave service.

8. In another vein, the National Association of Broadcasters ("NAB") and the CCBS request that the Commission adopt a "safety factor" to insure that no new interference result from use of the new skywave propagation model. How this "safety factor" should be determined is left up to the Commission. However, NAB indicates that the safety factor should guarantee that interference does not occur where it is predicted not to occur, and that if there is any statistical error in deriving an empirical formula from raw field strength measurements, the effects of any variances should occur below the threshold of signals causing interference. NAB adds that such a "safety factor" is appropriate in view the standards of good engineering practice.

9. Concern about the protection afforded skywave service of Class I stations is outside the scope of this proceeding. The new model will show that the service area of a northern Class I station may not be as large as formerly thought. It will also show that the interfering contour of a southern cochannel station may extend farther than previously thought. Thus, as a general rule, licensees of southern Class II stations operating on clear channels should not expect use of the new model to permit them to obtain significant increases in their facilities. Conversely, the predicted interfering contour of a northern Class II station may extend less than previously calculated. The relationship between the service and interfering contours of any two cochannel stations will be latitude and path dependent. Therefore, we can make no generalizations about facility increases that may be made possible by use of the new skywave model.

10. Moreover, the new skywave model is only one component used in depicting AM service. In MM Docket No. 88-511, 3 FCC Rcd 6448 (1988), the Commission had under consideration new methods for calculating nighttime protection for stations in the AM service. That docket will shortly be terminated without action under authority delegated to the Chief, Mass Media Bureau. However, we will continue to consider this question in MM Docket No. 87-267. See *Notice of Proposed Rule Making* adopted April 12, 1990. Predicted skywave signal strength is only one of several important factors used in determining the permissibility of proposed facilities. Analysis of its possible effects should also take into account other pending changes in the AM technical standards.

11. We are adopting the new skywave model because it is the most accurate and convenient method of predicting skywave signal strength ever developed. It simply reflects our best estimate of signal strength and coverage. Therefore, we do not agree with the suggestion of NAB and CCBS that it should be modified by some subjectively applied "safety factor." If after considering the net effect of all the technical changes adopted in the AM improvement proceedings we find that the service of Class I stations will be adversely affected, we can determine on a policy (rather than an engineering) basis whether the protected contour for those stations should be changed. But this issue is outside the scope of this proceeding.

12. The majority of commenters agree with our conclusions. Almost all of the commenters, while favoring ultimate use of the new skywave model, opposed its use unless it were part of a comprehensive AM improvement package. The Association for Broadcast and Engineering Standards ("ABES") argued that the implementation of the new model *not* be deferred so that the benefit of the higher degree of predictive accuracy would not be postponed. Karl D. Lahm and Associates ("Lahm") suggested that the new model be implemented in concert with the changes in RSS interference computation under consideration in MM Docket No. 88-511. However, Lahm indicated that it should not be implemented earlier than six months after its adoption in order to give consulting firms time to develop appropriate computer programs.

13. We agree with Lahm and the majority of commenters that implementation of the new model must be deferred at least until the matters at issue in MM Dockets No. 88-511 and 87-267 are resolved. Notwithstanding the merits of the new skywave model, we would not want a few licensees in potentially unique circumstances to be able to take advantage of short-term "loop-holes" resulting from the implementation of new technical standards on a piecemeal basis. Such facility proposals, while permissible in the short-term, could require "grandfathering" in the long-term. We believe that implementing the skywave model at this time would only add to our application processing burden while potentially undermining our efforts to improve the AM service. Therefore, we will defer implementation of the new model until other related AM improvement matters have been resolved. At the same time, by adopting the new skywave model in principle at this time, we provide a technical basis for implementation and related technical proposals in the other AM improvement proceedings.

14. Several commenters noted some typographical errors and potential inconsistencies in the new skywave model as it was depicted in Appendix B of the *Notice*. For example, the term $(2 \text{ Pi} + 4.95 \tan^2 \text{ Theta}_M)$ in Equation 1 in Appendix B of the *Notice* should have read $(2 \text{ Pi} + 4.95 \tan^2 \text{ Phi}_M)$. This was corrected on November 15, 1988, by memorandum included in the docket file. H. R. Anderson and Associates, Inc. ("Anderson") believes the expression $[\cos (69+b_M)]$ in Equation 3 should be corrected to read $[\cos (69-b_M)]$.²

15. Anderson also questions the constant, 111.18, in Equation 4, arguing that the Handbook of Mathematical Functions by Abramowitz and Stegun (December, 1972) indicates that it should be 111.136. Anderson also notes that using a constant E layer of 100 km is inconsistent with departure angle formulas currently contained in §73.190, Figure 6a, and argues that either a single departure angle should be used for all situations (Anderson's preferred approach) or else the departure angle formula (2) in Appendix B must be corrected. Lahm expresses a similar concern, noting that a single angle is used in analyzing the impact of proposed Canadian and Mexican facilities. Lastly, du Treil, Lundin and Rackley, Inc. suggests that the results of all calculations made using the new skywave formulas be expressed to no more than three significant places so as to recognize natural limitations inherent in the technical data.

16. We appreciate the obviously close scrutiny given the proposed skywave model by the commenters and we concur with the recommendations summarized above. However, as Anderson notes elsewhere in its comments, the

constant 111.18 in Equation 4 is referenced in the 1986 U.S.-Mexican AM Agreement. We note, too, the inconsistency of the new model (which is based on a fixed E-layer height of 100 km and thus by implication a fixed departure angle) with §73.190, Figure 6a (which depicts a range of departure angles based on different E-layer heights). Other commenters noted some of these problems and questioned how the new skywave model would be applied to certain "grandfathered" facilities.

17. The purpose of the *Notice* in this proceeding was simply to obtain general approval for future use of the new skywave model. Thus, Appendix B merely defined the new model without addressing how it would be applied to or used in conjunction with other relevant AM technical standards. Discussion of any minor adjustments to the model proposed in the *Notice* required to make it conform to international treaties and other matters pertaining to its implementation is premature. The action we are taking here is limited to adopting the model on a conceptual basis. We will resolve matters related to the timing and manner of its implementation in the *Notice of Proposed Rule Making* in MM Docket No. 87-267 which is also being adopted on this date. That *Notice* will include a detailed appendix presenting all of the interrelated AM improvement proposals in their proper context for review and comment.

Use of Slant Distance

18. The *Notice* proposed substituting slant distance for the traditional great circle distance in making skywave calculations. Whereas great circle distance is the length of an arc (the curvature of which is based on the earth's radius) between two points on the earth's surface, slant distance includes an additional element which takes into consideration the additional distance required for a signal to reflect off the E-layer while travelling along the arc. For long distances, slant distance and great circle distance converge, but for very short distances they can be very different. Thus, the *Notice* pointed out that the accuracy of calculations would be improved in cases for which the slant distance is large in relation to the great circle distance. It also noted that the Consultative Committee on International Radio ("CCIR") Recommendation 435 recommended the use of slant distance for all propagation paths.

19. All of the parties filing comments addressing this issue agreed that generally substitution of slant distance for great circle distance would improve the accuracy of the calculations. Thus, "slant distance" will be used in conjunction with the implementation of the new skywave propagation model for determining the skywave service of and interference to domestic AM facilities. Predicted interference to and from foreign AM facilities will continue to be determined consistent with applicable treaties until such time as those treaties may be revised.

Reference Hour

20. The skywave model described in Appendix B of the *Notice* was based on skywave propagation data measured roughly six hours after sunset ("SS+6"). These data were considered more appropriate than SS+2 data because phenomena affecting nighttime skywave signal propagation have become stable by that time and skywave propagation conditions are most favorable. Thus, calculation of skywave interference using SS+6 data will produce a worst case result, which is consistent with the use of a

conservative interference prediction model. The Commission believes that use of such a model is essential if real reductions in AM skywave interference are to be achieved.

21. Most of the comments filed relating to reference hour supported the use of SS+6. All but one of the rest favored continued use of SS+2 (the current skywave propagation curves are based on SS+2 measurements). However, Robert A. Jones, P.E. ("Jones") suggested that SS+4 data might be a better choice, particularly in the case of the expanded band. Greater Media expressed the belief that SS+6 data would yield a more stable and uniform reference, free of frequency effects and less sensitive to path direction. However, it noted SS+6 approximates the "graveyard shift" rather than the period of maximum evening radio listening. Greater Media concluded that some stations would be afforded more protection than was necessary using SS+6 but that this was preferable to increased interference levels. The Continental Broadcasting Company agreed that SS+6 better represented the "worst case" for interference calculations. Lahm noted that use of SS+6 would result in better protection of full-time stations' service areas and enhanced prediction of the skywave service of Class I stations. The Hearst Corporation observed that SS+2 appears to be outmoded, having as its genesis old-time family listening habits of 40 years ago.

22. However, the 3-D Communications Corporation ("3-D"), licensee of a Class II station, and Bonneville International Corporation ("Bonneville") expressed the view that SS+2 should be retained as the reference hour. 3-D opposed use of SS+6 because it maximizes protection to the service of Class I stations, according greater importance to Class I skywave service than to Class II station groundwave service. Use of SS+2 would reduce the predicted service areas of Class I stations and afford greater opportunity for Class II stations to increase their facilities. Thus, 3-D argues that at the least, the Commission should adopt a two step procedure whereby a Class II station would protect a Class I station's SS+2 contour until SS+6. It could then reduce power to protect the SS+6 contour. Bonneville argues that SS+2 is more appropriate because all stations' listenership is higher at that time, and because it believes SS+6 is meaningless as a reference point without identifying the season and latitude (e.g., SS+6 in Alaska would be post-sunrise in the summer-time).

23. 3-D's support of SS+2 clearly reflects a belief that Class I stations should no longer be protected as extensively as they have been. The protection afforded Class I skywave service is, however, a policy decision that is essentially unrelated to the technical merits of the new skywave propagation model.³ Therefore, we do not wish to deal with it in this proceeding. It may be true, as Bonneville observes, that listenership levels peak at SS+2. A significant reduction in interference levels in the AM service could lead to increased listenership later in the evening. Because use of SS+2 would result in greater interference levels most of the night, we believe its use would be inconsistent with our desire to improve the quality of AM service. Because SS+6 measurements were obtained during winter months when the night at northern latitudes was very protracted, we find irrelevant the fact that SS+6 is latitude and season dependent. Winter data yield greater skywave coverage areas and concomitantly higher interference levels. Thus, their use reflects a

more conservative approach and would more effectively reduce overall interference levels. Because we believe that every possible means of reducing interference levels in the AM service should be pursued, we believe the public interest would best be served by use of the SS+6 measurement data. Therefore, we decline to modify the model to use SS+2 data instead of SS+6 measurement data.

Conversion factor for 10% skywave field strength

24. The *Notice* also proposed a formula (number eight in Appendix B) for calculating 10% skywave interference levels based upon the new model, noting that the correction factor varies from approximately 6 dB in southern latitudes to roughly 10 dB in northern latitudes.⁴ However, the *Notice* described two possible alternatives to this approach. The first would simply be to use the average correction factor (8 dB) nationwide. The other would be to establish three zones based on latitude with different correction factors.

25. The majority of the comments favored using the formula proposed in the *Notice* although many commenters did not give a reason. However, Jones argued that the formula could be safely eliminated, because a standard conversion factor would overprotect all stations and use of an 8 dB correction factor would make the Commission's Rules consistent with those adopted at the 1981 Region 2 Conference. Bonneville likewise expressed the belief that use of an 8 dB correction factor was an acceptable compromise. However, Greater Media supported use of the formula, arguing that only by calculation can the best possible accuracy be obtained and noting that such calculations are readily and inexpensively performed using computers.

26. We disagree with Jones' opinion that a uniform 8 dB value would overprotect all stations. In fact, we find that it would tend to overprotect stations in southern latitudes and underprotect stations in northern latitudes. Thus, we continue to believe that because experience has provided us with the information needed to develop a highly accurate skywave signal strength prediction model, all components (such as the 10% skywave correction factor) of the model should be as accurate as possible. We agree with Greater Media that the effort required to implement the 10% skywave correction formula on computers is negligible and the calculation time minimal. Therefore, we are adopting the 10% skywave correction factor as proposed.

CONCLUSION

27. We conclude that no amendment of the skywave propagation model set forth in Appendix B of the *Notice* is necessary. Therefore, we adopt that model exactly as proposed. However, consistent with the discussion in paragraphs 12 and 13, *supra*, we will not incorporate the model into the rules at this time. Instead, in the MM Docket No. 87-267 AM improvement proceeding, we propose rules that will implement the new skywave model in conjunction with other related changes in the AM technical standards. Thus, interested parties have an opportunity to comment on the final effect of all of our recent AM improvement actions, including any minor refinements of the skywave model that may be necessary to conform it to domestic policy and international agree-

ments. We also find that the purpose of this proceeding has been fulfilled and therefore conclude that it should be terminated.

FINAL REGULATORY FLEXIBILITY ANALYSIS

28. Pursuant to the Regulatory Flexibility Act of 1980, the Commission's final analysis is as follows:

I. Need and Purpose of this Action:

The Commission is replacing the AM skywave propagation curves with a new model based on a data developed over many decades which offer extensive information on skywave propagation characteristics. Use of the new skywave model will enable the Commission to more accurately predict skywave coverage and interference, and will provide us with an important means of potentially improving the quality of the AM service.

II. Summary of Issues Raised by the Public Comments in Response to the Initial Regulatory Flexibility Analysis :

No commenters addressed the Initial Regulatory Flexibility Analysis.

III. Significant Alternatives Considered and >Rejected:

There are no alternatives to the action taken here that would accomplish the stated purpose.

29. The Secretary shall send a copy of this *Report and Order*, including the Final Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration in accordance with paragraph 603(a) of the Regulatory Flexibility Act (Pub. L. No. 96-354, 94 Stat. 1164, 5 U.S.C. Section 601 *et seq.* (1981)).

PAPERWORK REDUCTION ACT STATEMENT

30. While a new skywave propagation model is being adopted in this action, its effective date is being deferred. Therefore, no rule changes are being implemented at this time, so no new or modified form, information collection, and/or record keeping, labeling, disclosure, or record retention requirements subject to the Paperwork Reduction Act of 1980 will result at this time. Neither will the burden hours placed upon the public be increased or decreased. We believe that implementation of the new skywave model will have little, if any impact on the Paperwork Reduction Act concerns listed above, except that the burden hours placed upon the public may be decreased through automation of skywave signal calculations on inexpensive and widely available computers.

ORDERING CLAUSES

31. Accordingly, IT IS ORDERED That pursuant to the authority contained in Sections 4(i) and 303(r) of the Communications Act of 1934, as amended, the skywave signal strength prediction model described by the formulas contained in Appendix A below IS ADOPTED. However, its implementation will be deferred pending action on related AM improvement proceedings.

32. IT IS FURTHER ORDERED that this proceeding IS TERMINATED.

FEDERAL COMMUNICATIONS COMMISSION

Donna R. Searcy
Secretary

APPENDIX A

Comments

3-D Communications Corporation
Association for Broadcast Engineering Standards, Inc.
Bonneville International Corporation
CBS, Inc.
Capital Cities/ABC, Inc.
Clear Channel Broadcasting Service
Continental Broadcasting
Cox Enterprises, Inc.
du Treil, Lundin & Rackley, Inc.
E. Harold Munn Jr., & Associates, Inc.
Empire Radio Partners, Ltd.
Greater Media, Inc.
H & C Communications, Inc.
H. R. Anderson & Associates, Inc.
Hearst Corporation
Karl D. Lahm & Associates
National Association of Broadcasters
Outlet Broadcasting, Inc.
Robert A. Jones, P.E.
Timothy C. Cutforth, P.E.

Reply Comments

Clear Channel Broadcasting Service
Eric Chandler Communications of San Diego, Inc.
Ex Parte Comments filed by R. Morgan Burrow, Jr.,
P.E.
Fisher Broadcasting, Inc.
Jefferson Pilot Broadcasting Company
Nolte Communications, Inc.

APPENDIX B - CALCULATION OF SKYWAVE FIELD STRENGTH

The following formulas are 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, $F_c(50)$, for a characteristic field strength of 100 mV/m at 1 km is given by:

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

The slant distance, D , is given by:

$$D = \sqrt{40,000 + d^2} \text{ km} \quad (2)$$

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

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

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

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

Where:

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

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:

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

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

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

Note(1): If $|\phi_M|$ is greater than 60 degrees, equation (1) is evaluated for $|\phi_M| = 60$ 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, $F_c(10)$, is given by:

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

Where:

$\Delta = 6$ when $|\phi_M| < 40$

$\Delta = 0.2|\phi_M| - 2$ when $40 \leq |\phi_M| \leq 60$

$\Delta = 10$ when $|\phi_M| > 60$

For the complete text of this revised CFR Section, See the Notice of Proposed Rule Making in MM Docket No. 87-267, FCC 90-136 at 55 FR

FOOTNOTES

¹ A list of parties filing comments and reply comments is given in Appendix A. A skywave signal is that portion of a station's transmitted signal that is reflected by the ionosphere back to the earth. The strength of the reflected signal is generally negligible during the day and increases gradually after sunset.

² However, we have verified that Equation 3 as depicted in Appendix B is correct. The negative term sought by Anderson would appear to follow from the convention indicated in Note 2, which states that western longitudes should be considered negative.

³ See §§ 10-12, *supra*.

⁴ The correction factor is used to derive the 10% skywave interfering signal strength (or contour) from the 50% skywave service signal strength (or contour). The Commission traditionally uses 50% reliability signals or contours to define service and 10% reliability signals or contours to define interference.

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

MM Docket No. 89-46

In the Matter of
Policies to Encourage
Interference Reduction Between
AM Broadcast Stations

REPORT AND ORDER
(Proceeding Terminated)

Adopted: April 12, 1990;

Released: July 18, 1990

By the Commission:

1. The Commission has before it the *Notice of Proposed Rule Making* in this proceeding, 4 FCC Rcd 2430 (1989). That *Notice* looked toward the development of formal procedures for AM licensees to reduce interstation interference through agreements among stations, and considered related changes in our AM processing rules that may facilitate such procedures. In the *Notice*, we requested comment concerning the existing policy of "grandfathering" deleted AM facilities, the Commission rule of proscribing contingent applications, the requirement that a major change in AM facilities be subject to competing applications, and the establishment of a "local service floor." Thirteen parties filed comments and/or reply comments.¹ After careful consideration and review of these comments, we are adopting the proposals presented in the *Notice*.

BACKGROUND

2. The *Notice* in this proceeding is an outgrowth of both the Mass Media Bureau's *Report on the Status of the AM Broadcast Rules*, released April 3, 1986, and the subsequent *Notice of Inquiry*, 2 FCC Rcd 5014 (1987), addressing the technical, legal, and policy issues pertaining to AM broadcasting.² In response to the *Notice of Inquiry*, commenters have emphasized the need to improve the overall quality of the AM service. In order to address these concerns, we have initiated four different dockets.³ Today we are adopting a *Notice of Proposed Rule Making* in MM Docket No. 87-267, through which we intend to refine and integrate the proposals made in these earlier dockets into a master plan for achieving a significantly improved AM broadcast service. As an integral part of that master plan, we now remove regulatory barriers that prevent or discourage individual AM stations from lessening the amount of interstation interference and improving the quality of service through private agreements. The result of these negotiations between AM stations may be the filing of contingent applications as discussed in paragraphs 5, 6, 7 and 8, *infra*, or one station's deleting or modifying its facilities. In order to provide this opportu-

nity, it is necessary to make certain changes in our AM rules and procedures.⁴ After providing background information, we discuss these changes below.

3. In order to put these proposals into perspective, it is necessary to discuss current AM assignment criteria, which are based on the concept of protected contours.⁵ Under our Rules, AM proposals are examined to determine whether a proscribed interfering contour would overlap the protected service contour of the existing station. The propagation characteristics of the AM signal differ during daytime and nighttime hours. During daytime hours, the extent of the service and interfering contours can be calculated on the basis of frequency, power, and ground conductivity. These contours are referred to as groundwave contours. Sections 73.37(a) and (b) of the Rules set forth the permitted overlap of groundwave contours between protected and interfering stations. Due to ionospheric reflection of AM signals during nighttime hours, AM signals propagate over significantly greater distances at night than during daytime hours. The contour of such nighttime signals is referred to as the skywave contour. In regard to AM nighttime interference criteria, Section 73.182 of the Rules sets forth interference protection criteria based on groundwave and skywave contour protection as well as the class of the protected AM station.

4. The comments we received were unanimous concerning the need to improve the technical quality of the AM service. We received several relevant comments pertaining to the present AM assignment scheme. Both the Association for Broadcasting Engineering Standards ("ABES") and Radio WADO, Inc., referred to our 1964 action in Docket No. 15084 establishing Section 73.37 of the Rules, commonly referred to as the "go-no-go" rules. *AM Station Assignment Standards*, 45 FCC 1515 (1964). The expression "go-no-go" refers to the decision to evaluate proposals on the basis of prohibited contour overlap rather than a subjective weighing of audience gains and losses. In that action we noted the increase in the percentage of AM stations causing or receiving objectionable interference within a prescribed service area during the years 1952 to 1962. Specifically, we stated the following:

The number of new stations causing more than 1% of 'objectionable interference' rose from 2% in 1952 to 21% in 1962. The percentage receiving more than 1% rose from 18% to 36% in the same period. A further study of 60 consecutive "pre-freeze" applications for new stations granted from April 1962, to April 1963, showed that 42% either caused or received some degree of "objectionable interference."

AM Station Assignment Standards, supra at 1522. Radio WADO, Inc. made two additional observations. First, Radio WADO observes that the "go-no-go" rules did not end the creation of objectionable AM interference because Section 73.37(b) of the Rules permits interference received under certain situations, and propagation conditions, in some situations, lead to stronger signals and therefore more interference than was predicted. Radio WADO also notes that the "go-no-go" rules did nothing to reduce existing interference in the AM band. The ABES makes a similar observation, noting that in 1964, approximately 4,000 AM stations were in existence, and a significant proportion of these stations were causing or receiving objectionable interference. Of the approximately

974 stations authorized since 1964, ABES correctly notes that many of these were "shoehorned in" with interfering contours closely approaching the protected contours of existing stations.

"GRANDFATHERING" DELETED AM STATIONS

5. When an AM station is deleted, we have, as a matter of policy, maintained the radiofrequency radiation rights for a period of one year for parties wishing to file an application to replace the deleted facility.⁶ In many cases, however, this policy leads to the perpetuation of AM stations' causing or receiving objectionable interference. We concur with Group W that our present policy of maintaining these deleted AM facilities is actually a disincentive to bringing these stations into compliance with current AM assignment standards. Parties filing comments supported our proposal to require applicants for such deleted facilities to comply with the technical requirements in effect at the time that they file their applications. Therefore, we are adopting this new policy that new applicants must meet current technical standards.

CONTINGENT APPLICATIONS

6. Section 73.3517 of the Rules prohibits the acceptance of contingent applications for construction permits proposing either new or modified facilities.⁷ Currently, parties cannot file such applications even though the applications might lead to the improvement in one station's facilities made possible by changes to the facilities of the other station, and a concomitant overall reduction in AM interference. We continue to believe that, as a general matter, accepting such speculative applications contingent on the grant of another application imposes an unwarranted burden on our administrative resources. However, the *Notice* proposed permitting contingent applications leading to an overall reduction in AM interference. For example, one station may conclude an agreement with a nearby station on an adjacent channel whereby the second station reduces its daytime and nighttime power. This would reduce interference caused to the first (and other) stations and could allow the first station to improve its daytime facilities. This proposal envisions two or more applications being filed and granted simultaneously. The comments that we received supported this proposal.

7. We agree with the National Association of Broadcasters ("NAB") that there is a need for a full public interest evaluation of such proposals and while we do not foresee any particular types of abuse, we will be alert for such problems. On the other hand, we disagree with the NAB that such contingent applications should be limited to situations in which one station actually terminates operation, thereby affording "finality" to the process. In addition to terminating operation, AM stations may significantly reduce interference by reducing power, terminating nighttime operation or using a directional antenna. We believe that giving AM stations this additional option for reducing interference is consistent with our goal of improving the quality of the AM radio service. The amended contingent application rule will apply to both deletions and modifications of existing AM stations.⁸ We believe that "finality" will be achieved by the fact that any

subsequent application by the modified station, or a party filing for a deleted facility, will have to comply with the technical rules then in effect.

8. We are amending Section 73.3517 of the Rules to permit contingent applications that would assure a reduction in overall AM interference.⁹ This amendment should provide two incentives for stations to enter into such agreements. Both of these incentives will benefit the station making the payment to the other station. First, as discussed in paragraph 10, *infra*, we are protecting the station improving its facilities from competing applications. This protection will be afforded to both major change applications such as an increase in power, and also to minor changes such as modifying a directional antenna pattern. The second incentive for contingent application arrangements concerns the calculation of the RSS limit.¹⁰ During nighttime hours, an existing station is protected from its transmitter to its RSS contour. The effect of reducing interference toward a station would be to reduce the RSS limit at the old RSS contour, thereby expanding that station's protected service area. As indicated in paragraph 38 of the *Notice*, recalculation of the RSS occurs upon deletion or modification of an AM station contributing to the RSS limit.¹¹ Termination or modification of an AM station's facilities may also reduce the RSS limit of an AM station not a party to the contingent application arrangement. In turn, this reduction in the latter's RSS limit may preclude a station that is party to the arrangement from improving its nighttime operation even if it were willing to pay other stations to allow it to do so. To remedy this potential problem, all associated contingent applications will be granted simultaneously. This will require a station seeking an improvement in nighttime operation to protect only existing RSS contours of all stations not a party to the contingent application arrangement.

COMPETING APPLICATIONS

9. The contingent application procedure discussed above assumes that one station will either delete or modify its facilities in order to permit the other station to improve its area of signal coverage or service quality. This improvement might be achieved through a major or a minor facilities change.¹² Under our current application processing procedures, applications for either type of change are subject to competing applications.¹³ A competing application, or the possibility of a competing application, might discourage parties from initiating such proposals due to the costs of a comparative hearing, or the risk that a competing applicant may prevail in a comparative proceeding. These factors could discourage proposals that would lead to a reduction in AM interference.

10. To reduce this deterrent substantially, the *Notice* proposed that any competing application would have to protect the licensed facilities of the stations participating in the contingent application arrangement even though there might be no conflict with any licensed facility after the arrangement is implemented. In addition, the competing application would be subject to the applicable cut-off date. The commenters all supported this proposal. We are amending Section 73.3571 of the Rules to codify this proposal. We find such action to be in the public interest because it removes a potentially significant deterrent to our efforts to improve the quality of the AM service. It is

clearly within our authority to promulgate rules limiting eligibility to submit a competing application when we determine that such action promotes a specific public interest objective. *U. S. v. Storer Broadcasting Company*, 351 U.S. 192 (1956). Such action, accordingly, does not violate the holding in *Ashbacker Radio Corp. v. FCC*, 326 U.S. 327 (1945), which prohibits us from granting one of two mutually exclusive applications for an available frequency filed by two eligible applicants without comparatively considering the two applications. In connection with this, we note that under our amended procedure, the currently licensed facilities of any party to a contingent application arrangement would preclude consideration of any competing application proposal. See *Amendment of the Commission's Rules Regarding Modification of FM and TV Authorizations to Specify a New Community of License*, 4 FCC Rcd 4870, 4873 (1989), *recon. pending*.

LOCAL SERVICE FLOOR

11. We emphasize that a significant factor underlying our decision to grant or deny a contingent application arrangement involving deletion or reduction in AM facilities would be whether it satisfies the public interest requirement of a local service floor - a level of broadcast service that must be maintained subsequent to any deletion or reduction in AM facilities. The comments concurred that there was a need to require a minimum level of service. After careful consideration of the comments, we agree with the NAB that we cannot establish a quantifiable service floor that can be uniformly applied with respect to the replacement of deleted facilities or our public interest evaluation of contingent application arrangements. Instead, we will consider the issue of a local service floor on a case-by-case basis. However, the comments were helpful to our efforts to identify some guidelines that could be of value in regard to a local service floor.

12. At the outset, we agree with Great American Television and Radio Company, Inc., ABES and Karl D. Lahm that, consistent with longstanding precedent, we should consider the availability of both AM and FM service in determining whether an area affected by a deletion or a contingent application arrangement has sufficient service, since AM and FM are part of a single aural service. *Anamosa and Iowa City, Iowa*, 60 FCC 2d 1041 (1976). Also, like du Treil, Lundin, and Rackley, Inc., we do not envision our being able to make the public interest finding necessary for the grant of a contingent application arrangement or deletion request if the proposal would create "white" or "gray" areas.¹⁴ In most cases, our public interest evaluation will weigh the amount of AM interference that will be eliminated against the number of AM and FM services remaining available to the areas that will lose service. Our evaluation will also take into account the areas and populations that will gain service as a result of the proposal and the availability of other services to these areas.

13. Both the decision to eliminate the grandfathering of deleted AM facilities and the possibility of contingent application arrangements that would delete such a facility trigger our concern for a community possibly losing its only broadcast service. We do not, however, believe that we must establish an exception to our new policy of not grandfathering deleted AM facilities if the deleted station happens to be a community's only local service. We reach

this conclusion for two reasons. First, in regard to stations close to metropolitan areas, the community losing the facility could very well be receiving primary and city grade service from many other stations. We believe that the availability of two or more primary services coupled with a reduction in AM interference would justify our not permitting a party to restore a deleted AM station that would not comply with current technical requirements. We would also use this guideline in evaluating a contingent application arrangement proposing deletion of a community's only local aural service. Second, in regard to the deletion of an AM station in a more remote area, we believe another AM station could restore local service, albeit with less powerful or directional facilities, and comply with our technical requirements. We believe it extremely unlikely that, in an area where there is no primary or city grade service, lack of available spectrum is the cause. It is far more likely the case that economic factors make it impossible to profitably operate a station. In such situations, there would moreover generally be adequate AM or FM spectrum available for a local aural service at a later date, if demand warrants.

CONCLUSION

14. We continue to believe that it is in the public interest to encourage interstation agreements proposing a reduction in AM interference and to provide a procedural framework that would facilitate such agreements. Based on our consideration of the record in this proceeding and for the reasons set forth above, we conclude that it is appropriate to terminate the current policy of grandfathering deleted AM facilities, to permit contingent applications that result in overall interference reduction, to require that competing applications filed against such contingent applications protect the licensed facilities of those stations participating in the contingent application arrangement, not to establish a specific local service floor that would be applicable to all situations, and to amend Sections 73.1750, 73.3517, and 73.3571 of the Rules as set forth in the attached Appendix B.

FINAL REGULATORY FLEXIBILITY ANALYSIS

15. Pursuant to Regulatory Flexibility Act of 1980, our final analysis is as follows:

I. Need for and Purpose of the Rule

We have concluded that current rules and policies are an unnecessary deterrent to improving the technical quality of the AM band and agreements between AM stations looking toward a reduction in AM interference.

II. Flexibility Issues Raised in the Comments

No regulatory flexibility issues were raised in the comments.

III. Significant Alternatives Considered but Not Adopted

The alternative would be to make no change in current rules and policies. This would not achieve the public interest benefit of facilitating reductions in AM interference.

PAPERWORK REDUCTION ACT STATEMENT

16. The proposal contained herein has been analyzed with respect to the Paperwork Reduction Act of 1980, and found to impose a new or modified information collection requirement on the public. Implementation of any new or modified requirement will be subject to approval by the Office of Management and Budget as prescribed by the Act.

ORDERING CLAUSES

17. Accordingly, IT IS ORDERED. That the amendments to Part 73 of the Commission's Rules and Regulations set forth in Appendix B below ARE ADOPTED. The effective date of these amendments will be established by further Commission action in MM Docket No. 87-267.

18. IT IS FURTHER ORDERED, That this proceeding IS TERMINATED.

19. Authority for the action taken herein is contained in Sections 4(i) and (j), and 303(r), of the Communications Act of 1934, as amended, 47 U.S.C. §154(i), (j), 303(r).

20. For further information concerning this proceeding, contact Robert Hayne, Mass Media Bureau, (202) 634-6530.

FEDERAL COMMUNICATIONS COMMISSION

Donna R. Searcy
Secretary

APPENDIX A

The following parties submitted comments and or reply comments:

Association for Broadcast Engineering Standards, Inc.

Glenn F. Bircher

Capital Cities/ABC, Inc.

CBS, Inc.

Corporation for Public Broadcasting

du Treil, Lundin & Rackley, Inc.

Great American Television and Radio Company, Inc.

Karl D. Lahm, P.E.

The KICD Stations

Harold Munn Jr. & Associates, Inc.

National Association of Broadcasters

Radio WADO, Inc.

Westinghouse Broadcasting Company, Inc.

APPENDIX B

Part 73 of Title 47 of the CFR is amended as follows:

1. The authority citation for Part 73 continues to read as follows:

Authority: 47 U.S.C. 154 and 303.

2. Section 73.1750 is amended to add the following language at the end to read as follows:

§ 73.1750 Discontinuance of operation

***If a licensee surrenders its license pursuant to an interference reduction arrangement, and its surrender is contingent upon the grant of another application, the licensee surrendering the license must identify in its notification the contingencies involved.

3. Section 73.3517 is amended by adding new paragraph (c) to read as follows:

§ 73.3517 Contingent applications

(c) Upon payment of the filing fees prescribed in §1.1111 of this chapter, the Commission will accept two or more applications filed by existing AM licensees for modification of facilities that are contingent upon granting of both, if granting such contingent applications will reduce interference to one or more AM stations or will otherwise increase the area of interference-free service. The applications must state that they are filed pursuant to an interference reduction arrangement and must cross-reference all other contingent applications.

4. Section 73.3571 is amended by adding new paragraph (c)(1) to read as follows:

§ 73.3571 Processing of AM broadcast station applications

(c) ***

(1) In order to grant a major or minor change application made contingent upon the grant of another licensee's request for a facility modification, the Commission will not consider mutually exclusive applications by other parties that would not protect the currently authorized facilities of the contingent applicants. Such major change applications remain, however, subject to the provisions of §§73.3580 and 1.1111. The Commission shall grant contingent requests for construction permits for station modifications only upon a finding that such action will promote the public interest, convenience and necessity.

FOOTNOTES

¹ A list of those parties is contained in Appendix A.

² The 107 AM channels are divided into three groups of channels: clear channels, regional channels and local channels. Four basic classes of stations evolved to operate on these three channel groups. Class I and Class II stations operate on clear channels. Class I stations provide extensive primary

(groundwave) service during the day and night, with skywave service during nighttime hours generally extending out to 750 miles or more from the transmitter. Class II stations protect the Class I station on the channel and provide primary service only, the area of which depends upon station location, power and frequency. Class III stations represent an intermediate category and operate on regional channels, providing service to larger cities and the surrounding rural areas. Class IV stations operate on local channels and provide primary service to a community and the immediately contiguous suburban or rural areas. See 47 C.F.R. §§73.21-37, 73.182. Shortly, there will be ten additional AM channels in the expanded AM band between 1605 and 1705 kHz. Rules governing these stations are being considered in a companion item in MM Docket No. 87-267.

³ See *Improved Methods for Calculating Skywave Field Strength in the AM Broadcast Band*, MM Docket No. 88-508, 3 FCC Rcd 6431 (1988); *Enhanced Nighttime Operation for Class II - S and III - S AM Radio Broadcast Stations*, MM Docket No. 88-509, 3 FCC Rcd 6444 (1988); *Improved Methods for Calculating Groundwave Field Strength in the AM Broadcast Band*, MM Docket No. 88-510, 3 FCC Rcd 6577 (1988); *Review of the Methods for Calculating Nighttime Protection for Stations in the AM Broadcast Service*, MM Docket No. 88-511, 3 FCC Rcd 6448 (1988).

⁴ Group W and duTreil, Lundin & Rackley, Inc. have suggested the issuance of tax certificates pursuant to Section 1071(a) of the Internal Revenue Code, 28 U.S.C. §1071(a), as an additional means of encouraging reductions in AM interference. The use of tax incentives was not proposed in the *Notice*, and is therefore outside the scope of this proceeding. In the *Notice of Proposed Rule Making* we adopt today in MM Docket No. 87-267, however, we propose the use of Section 1071(a) tax certificates in connection with stations turning in their licenses as part of a voluntary agreement to reduce interference, and request comment on the use of tax certificates when stations reduce interference as part of a voluntary agreement.

⁵ Objectionable interference to particular service contours is defined in Sections 73.37 and 73.182 of the Commission's Rules.

⁶ The one year period commences upon release of a *Public Notice* announcing the deletion of the facility. Parties may file applications for the deleted facility after release of the *Public Notice*.

⁷ Section 73.3517 of the Rules does permit a modification application by a proposed assignee or transferee in connection with an assignment or transfer application.

⁸ We emphasize that after deletion of an AM station, a third party may file an application, in accordance with current AM technical requirements, proposing, in substantial part, reestablishment of the deleted AM station.

⁹ The NAB has suggested a waiver approach to contingent applications based on AM interference reduction. In view of the benefits that would flow from such applications, we believe that a general rule would better serve the public interest. A rule gives certainty and would be preferred over an *ad hoc* case by case approach, especially where a processing rule is involved.

¹⁰ The RSS limit is derived by calculating the effect of skywave interference from other nighttime AM stations on the potential service area of the AM station. See Section 73.182 of the Rules. In a separate action today in MM Docket No. 87-267, the Commission is proposing that the RSS method for calculating interference be replaced by a single signal method.

¹¹ This recalculation will occur upon either release of a *Public Notice* announcing the deletion of the AM station, or, in the case of modified facilities of a station contributing to another station's RSS limit, upon licensing of those modified facilities.

¹² It is also conceivable that a station could benefit by having its RSS limit decreased, which would not require the filing of an application.

¹³ Section 73.3571(c) of the Rules provides for a cut-off list for major change applications. For minor change applications, we will consider any mutually exclusive application filed prior to acceptance and grant of the earlier-filed minor change application.

¹⁴ A "white" area is an area that receives no full-time aural service. A "gray" area receives one full-time aural service.

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

MM Docket No. 88-510

In the Matter of

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

REPORT AND ORDER
(Proceeding Terminated)

Adopted: April 12, 1990;

Released: July 18, 1990

By the Commission:

INTRODUCTION

1. The Commission has decided to replace its current AM broadcast band groundwave propagation curves with a new set of curves. Over a significant range of distances, the current curves are a result of "curve fitting" that estimated values between the curve segments that could be calculated. A 1986 computer program allowed mathematical calculation of predicted groundwave field strengths at all distances. The new curves are derived from data generated by that computer program. While the new curves are more accurate than the old curves, we will not make the change effective until related changes in technical assignment criteria are adopted.

BACKGROUND

2. The *Notice of Proposed Rule Making* ("Notice") proposed replacing the existing AM groundwave propagation curves with a new, more accurate set of curves for depicting groundwave service and interference.¹ In addition, the *Notice* raised the matter of improving the FCC ground conductivity map, Figure M3, but proposed no revision because adequate funds were not available to pursue this extensive project. The "Kirke method," which is the procedure currently specified in our rules for calculating groundwave field strength over paths containing more than one ground conductivity value, was also discussed. Finally, we requested comments on whether the proposed changes should be implemented in a "piece meal" fashion or coordinated with action in related proceedings to change other AM technical assignment criteria.

3. To put this proceeding in context, it is one of several that are outgrowths of the MM Docket No. 87-267 *Notice of Inquiry* ("Inquiry").² The *Inquiry* is the Commission's comprehensive review of AM broadcast assignment criteria and other technical standards. It followed comments filed on a 1986 Mass Media Bureau Report on the Status of the AM Broadcast Rules (RM-5532). Through the *Inquiry* and the Region 2 Administrative Radio Conference, the AM broadcast industry has reached general agreement

on many of the new technical approaches needed for AM improvement, including the revised groundwave propagation curves considered in this proceeding.

COMMENT SUMMARY

4. Ten parties filed comments and five parties filed reply comments.³ There is unanimous support in the comments for adopting the proposed new groundwave propagation curves. Several commenters request that the Commission continue allowing field strength measurements to be made in lieu of the calculations using the curves. Three parties make suggestions regarding the physical characteristics of the graphs on which the curves are plotted.⁴

5. Comments vary on the importance of improving the Figure M3 ground conductivity map. NAB argues that it is less important than adopting the new curves. Cox urges the Commission to proceed cautiously, starting with thorough data collection. WGN, CBS and especially ABES and Nolte indicate that revision of Figure M3 is a significant task that merits immediate, high-priority Commission attention. ABES suggests that when we adopt new curves, we should keep this Docket open to expedite Figure M3 revision. Nolte suggests that the Commission require conductivity information to be submitted in applications in order to begin building a data base for Figure M3 revision.

6. Generally, retaining the "Kirke method" was supported by the comments that addressed it. Lahm suggests that when resources are available, the Commission should conduct a study to find an improved methodology.

7. The consensus of comments favored coordinated implementation with the other related AM improvement proceedings. Those supporting this approach included WGN, Clear, Empire, Cox, du Treil, NAB, Fisher, Outlet, and Pilot. NAB also suggested that we need to revise the first adjacent channel protection ratio at the same time as the current proposals are implemented. Outlet contends that implementation should occur only after international agreements are ratified. A few commenters did not agree. ABES takes the position that groundwave changes don't need to wait for resolution of skywave issues. Lahm suggests limited interim uses of the new curves, but urges the Commission to allow six months before use of the new curves is required. A few other miscellaneous implementation matters were raised in comments.⁵

DISCUSSION

8. In light of the comments, we are adopting the proposed change in the groundwave propagation curves. We find that the new curves more accurately reflect groundwave signal coverage than the existing curves and should lead to better prediction of when objectionable interference does or does not exist.

9. We also considered the suggested changes in the horizontal and vertical scales, but conclude that the current format offers the best compromise between ease of distinguishing values and range of values included. As proposed, we are also amending the language in §73.184 pertaining to Figure 20 to refer to metric units. In addition, we were surprised by the concern expressed in some comments that the proposal may have prohibited field

strength measurements in lieu of calculations. We did not intend to alter that provision of §73.183 and it is not being changed.

10. We continue to believe that updating Figure M3 is a beneficial project that we should pursue. However, current funding and staffing levels do not allow it at this time and we find no benefit to keeping this proceeding open until Figure M3 revision can be undertaken. Such revision will undoubtedly require additional notice and comment before changes can be adopted. We will act on this matter in a future Rule Making proceeding.

11. As we pointed out in the *Notice*, the Commission's rules currently specify a procedure for calculating groundwave field strengths over paths containing more than one ground conductivity value. This procedure is referred to as the equivalent distance method or "Kirke method." The information submitted in comments did not convince us that there is likely to be an alternative that is appreciably more accurate. Therefore, we believe our resources are better spent in other areas and we do not intend to pursue further at this time the possibility of using an alternative method.

12. We do not agree with the suggestion of NAB that the new groundwave model should be modified by some subjectively applied "safety factor." The model is being adopted because it is the most accurate method of predicting groundwave field strength available. If, after considering the net effect of all the technical changes proposed in the AM improvement proceedings, we discover that some stations will be adversely affected, arguments can then be made on a policy (rather than an engineering) basis that the protection standards should be altered.

13. The implementation date for the new curves will be established in the AM improvement proceeding in which we consider related assignment criteria. We find that Lahm's recommendation for limited uses in the interim would create administrative confusion. Canadian and Mexican negotiations and du Trier's 3-digit accuracy proposals are more appropriately considered in the assignment criteria Rule Making. All we adopt today is a propagation model with improved accuracy over the current model. The implementation details associated with the model's use, along with protection standards and other related matters, will be considered in conjunction with the *Notice of Proposed Rule Making* adopted today in the AM improvement proceeding, MM Docket No. 87-267.

14. Currently, Section 73.184 does not contain the actual groundwave propagation curves, but is instead followed by a note that these graphs are available by contacting the Commission. Thus, adopting new curves does not require Section 73.184 or the following note to be changed. Instead, we will prepare and make available sets of the new curves in the near future. Until implementation, the new curves will be labeled "Curves adopted April, 1990 are not in effect pending further action of the FCC." We fully expect that they will be available in this form for at least six months before they become effective, as Lahm requests. The individual data points which define field strength at various distances and which form the basis of the curves also will be made available.

CONCLUSION

15. After consideration of the record developed in this proceeding, we conclude that adoption of the proposed changes is in the public interest. The new groundwave model produces more accurate field strength predictions, allowing more confidence in service and interference determinations. Consistent with the discussion in paragraphs 13 and 14, *supra*, the model will not become effective at this time. In the AM improvement proceeding, MM Docket No. 87-267, we propose additional rules to integrate the new groundwave model with related AM technical and assignment standards. Thus, parties to this proceeding have an opportunity to comment on the final intended effect of all of our recent AM improvement actions, including any implementation refinements of the groundwave model.

FINAL REGULATORY FLEXIBILITY ANALYSIS

16. Pursuant to the Regulatory Flexibility Act of 1980, the Commission's final analysis is as follows:

I. Need and Purpose of this Action:

The Commission is replacing the AM groundwave propagation curves with a new model based on recent scientific analysis of groundwave measurement data and theory. Use of the new method will provide a more accurate depiction of service and interference relationships between AM broadcast stations.

II. Summary of Issues Raised by the Public Comments in Response to the Initial Regulatory Flexibility Analysis:

No commenters addressed the Initial Regulatory Flexibility Analysis.

III. Significant Alternatives Considered and Rejected:

There are no alternatives to the action taken here that would accomplish the stated purpose.

17. The Secretary shall send a copy of this *Report and Order*, including the Final Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration in accordance with paragraph 603(a) of the Regulatory Flexibility Act (Pub. L. No. 96-354, 94 Stat. 1164, 5 U.S.C. Section 601 *et seq.*, (1981)).

PAPERWORK REDUCTION ACT STATEMENT

18. The rule changes adopted here have 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 or decrease the burden hours on the public.

ORDERING CLAUSES

19. Accordingly, IT IS ORDERED That pursuant to the authority contained in Sections 4(i) and 303(r) of the Communications Act of 1934, as amended, the groundwave field strength prediction model described by the Graphs 1 to 19, and 20 that are available pursuant to the note following §73.184(f) IS ADOPTED. The effective date of this change will be established by further Commission action in related AM improvement proceedings. For the complete text of this revised CFR Section, See the

Notice of Proposed Rule Making in MM Docket 87-267, FCC 90-136 at 55 FR _____. IT IS FURTHER ORDERED that this proceeding IS TERMINATED.

FEDERAL COMMUNICATIONS COMMISSION

Donna R. Searcy
Secretary

FOOTNOTES

¹ See Notice of Proposed Rule Making in MM Docket 88-510, 3 FCC Rcd 6577 (1988).

² See Notice of Inquiry in MM Docket 87-267, 2 FCC Rcd 5014 (1987).

³ Comments were filed by Robert A. Jones, P.E. (Jones), WGN Continental Broadcasting Company (WGN), Clear Channel Broadcasting Service (Clear), Empire Radio Partners, Ltd. (Empire), CBS, Inc. (CBS), Association for Broadcast Engineering Standards, Inc. (ABES), Cox Enterprises, Inc. (Cox), National Association of Broadcasters (NAB), du Treil, Lundin & Rackley, Inc. (du Treil), and Karl D. Lahm, P.E. (Lahm). Reply comments were filed by Fisher Broadcasting, Inc. (Fisher), Jefferson Pilot Broadcasting Company (Pilot), Nolte Communications, Inc. (Nolte), and Clear. In addition, the submission of Outlet Broadcasting, Inc. (Outlet) was labelled comments, but clearly was intended to be reply comments, and will be treated as such.

⁴ Lahm suggests changing the horizontal scale to range from 0.5 to 50 kilometers (km) for the upper curves and from 50 to 5000 km for the lower curves, claiming this would eliminate the hard to read, seldom used 0.1 to 0.5 km section and expand the remaining portion, making the curves easier to use. He also proposes using graph paper with a less dense grid structure to facilitate curve reading and data plotting. Nolte opposes Lahm's suggestions and instead offers that the vertical scale should be extended at least to 2000 mV/m because measurement data of some high power stations plot off the current scale. Nolte also suggests that the curves be reprinted in two contrasting shades of black. Jones wants the existing scales to be retained so that NAB printed graph paper can still be used.

⁵ Lahm requests that the Commission generate and make available new data tables that are compatible with its GWAVE computer program. He also suggests that we urge Canada and Mexico to adopt the new curves and supports the conversion of Graph 20 of §73.184 to metric as was suggested in the Notice. Du Treil supports making Graph 20 metric and also suggests a requirement that all calculations be expressed to no more than three significant digits. NAB suggests the use of a "safety factor" when implementing new curves. Nolte agrees with du Treil on 3 digit accuracy, but disagrees with NAB on a safety factor. Nolte argues that the new prediction method must improve accuracy or it isn't useful, and that a safety factor would make the prediction less accurate. Finally, Outlet suggests that the computer program for predictions would be most useful if it is compatible with personal computers.