Alaska, AM Protection Standards
Alaska, Class I-N Stations
Alaska, Skywave Propagation
AM Station, Class III, Regional
Interference, Standards of Protection
Skywave Transmission

Class I-N AM stations established in Alaska with increased interference protection; high latitude skywave propagation curves adopted for use in Alaska.
—*AM Stations In Alaska*
MM Docket No. 83-807

FCC 84-489

BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

In the Matter of	
Protection Standards for AM Stations in Alaska	MM Docket No. 83-807 RM-4327

REPORT AND ORDER
(Proceeding Terminated)

Adopted: October 17, 1984; Released: October 25, 1984

BY THE COMMISSION:

Introduction

1. The Commission has before it for consideration its *Notice of Proposed Rule Making* pertaining to greater interference protection to certain AM stations in Alaska. The *Notice* was issued in response to a petition for rule making filed by the Alaska Broadcasters Association[1] in which it argued that increased skywave protection for these stations was necessary in order to ensure effective AM coverage in Alaska. To do this, the petition urged the Commission to accord Class I status to a group of

[1] The Alaska Public Broadcasting Commission joined in the filing of the petition.

16 Alaskan AM stations[2] which operate on United States Class I-A or I-B clear channels.[3]

2. In issuing the *Notice of Proposed Rule Making*, the Commission noted that Alaska is characterized by vast distances with relatively few major population centers. Because much of Alaska consists of scattered settlements far removed from the larger population centers, the people living in such places are beyond the reach of FM or TV stations and can only obtain service from distant AM stations which are relied on to provide weather and other vital information. In fact, some stations devote a significant part of each hour's broadcast to such material. However, it is important to note that because of the distances involved, much of Alaska must rely on very weak AM signal levels, often on the order of 0.1 mV/m. Although a signal level of 0.5 mV/m ordinarily is accepted as being necessary to provide satisfactory reception in rural areas, the petitioners argued that atmospheric and man-made noise are notably lower in Alaska so that signal levels well below 0.5 mV/m can provide adequate reception. In fact, we are told that this difference itself is sufficient to permit a 0.1 mV/m signal to provide service in Alaska equivalent to a 0.5 mV/m signal in the lower 48 states. However, as the petition pointed out, reliance on such signals presumes that they are not subjected to interference from other AM stations. Thus, the goal of the petition was to provide protection to the signals of these Alaskan stations so that the residents in remote communities could continue to receive the service provided by the existing signal levels. Petitioners sought to accomplish this through affording Class I protection to this group of stations.

[2] The stations listed in the petition are as follows:

Public	*Commercial/Religious*
KDLG Dillingham, 670 kHz	KYAK Anchorage, 650 kHz
KBRW Barrow, 680 kHz	KBYR Anchorage, 700 kHz
KOTZ Kotzebue, 720 kHz	KFQD Anchorage, 750 kHz
KSDP Sand Point, 840 kHz	KTNX Anchorage, 1080 kHz
KSKO McGrath, 870 kHz	KFAR Fairbanks, 660 kHz
	KCBF Fairbanks, 820 kHz
	KJNP North Pole, 1170 kHz
	KABN Long Island, 830 kHz
	KNOM Nome, 780 kHz
	KICY Nome, 850 kHz
	KGGN Valdez, 770 kHz

[3] Although the petition had not been entirely clear on this point, the Commission treated it as seeking the same protection as is afforded Class I-A or I-B stations. This would mean protecting the 0.5 mV/m 50% skywave contour during nighttime hours. However, the *Notice* did not propose to alter the obligation of these stations to continue to provide skywave protection to the existing Class I stations operating on these channels in the lower 48 states.

3. The petition also dealt with several related technical matters that were included in the *Notice*. It noted the difference in signal propagation in higher (i.e., more northerly) latitudes and sought the use of Figure 2 of Section 73.190 of the Commission's rules when calculating interference caused by the proposed Alaskan clear channel operations. Also, on the matter of antenna efficiency, it urged the Commission to allow a minimum field strength of 175 mV/m at one kilowatt rather than the 225 mV/m usually required for Class I stations. Finally, it sought exemption from the minimum power requirements applicable to such clear channel operations. In issuing the *Notice* the Commission agreed that it was appropriate to explore ways of responding to the unique needs of the State of Alaska through increased interference protection. Comments were invited on this matter and on the related technical issues raised in the petition.

4. Comments and replies were filed by several broadcast industry groups and extensive filings were received from Alaska broadcast organizations and licensees and affected individuals and groups living in outlying areas of Alaska. Although the perspectives of the groups did not always coincide, there was little disagreement among them on the major issues. All agreed that the needs of Alaska were unique and that special consideration needed to be given to those needs. Likewise there was essential agreement that enhanced protection to various Alaskan stations was an appropriate mechanism for responding to these needs. The National Association of Broadcasters supported the proposals, and the Clear Channel Broadcasting Service ("CCBS"), an organization representing clear channel broadcasters in the lower 48 states, offered comments on what it thought should be required of these stations in exchange for this increased interference protection. CCBS also offered suggestions on the standards of protection which were in essential accord with those filed by the Alaskan petitioners in their comments.

Discussion

5. *Introduction* Since the needs of Alaska have been amply documented and the value of enhanced interference protection has been equally well established, the only points requiring extended discussion are those involving the level of protection to be afforded and the technical standards which should be applied to the new category of stations in Alaska. They are to be designated as Class I-N stations and a new Figure 1b to Section 73.190 will be used for high latitude skywave signal calculations.

6. The proposal to reclassify these Alaskan stations rests on the fact that Class I stations receive greater interference protection both daytime and nighttime. However, this greater protection is premised on the ability of these stations to provide wide area service. That, in turn, is the product of high transmitting power and the use of a highly efficient antenna.

Lower power or reduced antenna efficiency limit a station's ability to provide wide area service daytime and could make it impossible to generate a significant skywave signal at night. Use of a high latitude curve could only exacerbate this situation as it would show an even lower level of skywave signal propagation. Because of this situation, it is not possible to develop protection standards for Alaska without giving full attention to these matters and their interrelationships.

7. *Antenna Efficiency* The *Notice* proposed using the minimum antenna efficiency of 225 mV/m which is normally applied to Class I stations, a step which would require many of the subject stations to construct new, taller towers. Almost all of the comments oppose such a requirement, contending it would impose undue burdens. Although CCBS did support the proposed minimum antenna efficiency of 225 mV/m, it recognized the problems involved and urged a flexible waiver policy in those cases where it can be shown that it is not possible to reach this level of antenna efficiency. From the information contained in the Alaskan filings, it is clear that such problems exist in most if not all of these cases. This material documents the great burden that would be imposed if we insisted on an efficiency of 225 mV/m. For many stations, FAA flight path limitations preclude the construction of taller towers. Likewise, the permafrost conditions in Alaska pose construction problems which could preclude construction of a taller antenna. Even for those able to construct, that construction often would have to be at a substantial distance from the station. In most cases, the stations already have constructed the most efficient antenna array possible under the circumstances. Since the record already contains a sufficient showing on which to base waiver in such cases, there is no point in imposing a requirement which would be waived in most instances. Overall, the record has demonstrated that these stations already employ antennas as efficient as their circumstances permit and therefore that no additional requirement should be imposed.

8. *Minimum Power* The next issue is the power to be used by these stations. Class I stations are required to operate with at least 10 kW, and most of the affected stations meet or exceed this requirement. The proposal to require at least 10 kW power was premised on the fact that Class I stations are designed to provide service to an extended area for which at least 10 kW was thought to be necessary. Additional power would enable these stations to serve even larger areas, but that was not proposed because of the difficulties such a requirement would pose. Although some, like CCBS, seem to suggest use of a 50 kW minimum combined with a waiver procedure, the principal thrust of the other filings is in terms of the difficulties faced in operating with high power. The costs of electricity are much higher in Alaska (in one example the best rate offered is 28.5¢ per kWh, a rate far higher than those charged in the lower

48 states) and can account for a substantial portion of a station's budget. In one case, electric power for a 5 kW operation now takes 10% of the station's total budget, a cost which would double if the station went to 10 kW and would increase proportionately more if greater power were required.

9. Although there is some support for not requiring a minimum power level, the Alaskan petitioners themselves do agree that the 10 kW figure is a reasonable one and that compliance with it can be achieved if some grace period is provided for the few stations in the group that now operate below this level.[4] Of the three stations in the original group which would be affected by imposition of a 10 kW minimum, one already has plans underway to increase its power to 10 kW, and petitioners hope that the other two could be increased to 10 kW within five years. No specific commitment, however, has been made to do so.

10. Although higher power would enable a station to better serve the needs of the citizens of Alaska, the matter is not one which can be resolved without giving full consideration to the practical problems such a requirement would impose. Apparently, all the stations that can feasibly increase beyond the 10 kW level already have done so, and placing such an obligation on the others would impose an onerous burden, perhaps one that could not even be met. At the same time, it does have to be recognized that at least some minimum power is necessary if these stations are to provide the service on which increased protection is premised. The *Notice* suggested 10 kW and the record supports the use of such a minimum. However, it does appear necessary to provide a grace period in which to achieve this power level. The five year period suggested by petitioners for stations not now using 10 kW seems appropriate. To protect the ability of these stations to achieve this power increase, it will be necessary to provide additional interference protection keyed to the prospective 10 kW operation. Thus, during the grace period, calculations involving these stations should be based on present facilities but with an assumed power of 10 kW. Once a station has increased power, calculations are to be based on its actual facilities. If the station does not increase power to at least 10 kW operation within five years, it will cease to be afforded protection as a Class I station and again will be treated as a Class II station. The *Notice* also sought comment on whether to provide enhanced interference protection to other stations operating on U.S. Clear Channels which were

[4] The 10 kW level is reached or exceeded by 11 of the 16 stations in the original group. According to petitioner, two others, KGGN Valdez and KSDP Sand Point are to be deleted from this group. Thus, only three: KOTZ Kotzebue, KSKO McGrath and KLDG Dillingham, all at 5 kW, remain below the 10kW level. Also, another station (KBBI, Homer) has asked to be added to this group, and it also would need to increase power from 5 kW to 10 kW.

not included in the original group. Based on the record it is clear that important benefits to Alaska's residents could flow from treating other stations in a like fashion. Existing coverage would be better protected. Also this would act as a spur to stations to increase power to 10 kW in order to get the increased protection. Therefore, we have decided to allow other stations operating on U.S. Clear Channels to become Class I stations by meeting the same requirements as the original group. So far, only station KBBI in Homer has asked to be included. However, it operates with less than 10 kW power, so an increase to that level would be necessary. It will be included in the original group which will have the benefit of the five-year grace period. Other stations also can be added later upon reaching the 10 kW power level.

11. *High Latitude Curves* As matters now stand, Figure 1a of Section 73.190 of the Commission's rules ordinarily is used to calculate both service and interference skywave contours for stations on clear channels, including those in Alaska. However, because Figure 1a does not reflect propagation conditions at higher latitudes, Alaskan stations have been permitted to seek waiver to permit the use of Figure 2 which does take the effect of latitude into account, a practice generally opposed by Class I stations. The *Notice* proposed a new 50% high latitude curve which would be used to determine the extent of skywave service and it proposed that values for field strength 10% of the time would be derived by increasing the 50% values by 8 dB.

12. All of the commenting parties agree that recognition should be given to high magnetic latitude effects in determining both service and interference skywave signal levels.[5] Although the parties recognize that precise depiction of high latitude effects will have to await completion of the ongoing studies in Alaska,[6] they concur in the appropriateness of adoption of an interim curve in the meantime. No question was raised about the 50% curve, but some parties thought that a different factor should be employed for deriving 10% field strength values. Instead of 8 dB, CCBS asserts that the precise difference between 50% and 10% field strength values at higher latitudes is 12.95 dB and argues for the use of this instead of the 8 dB as proposed. The Alaska Broadcasters Association agrees but suggests the use of the rounded-off correction factor of 13 dB. As the *Notice* indicated, the 8 dB figure was a tentative one. Based on the engineering showings in the record we will adopt new 50% and 10%

[5] The effect in both is to show that given signal levels do not extend as far as they would at lower latitudes, thereby showing a reduced area of service and a lessened potential for interference.

[6] These studies are part of a cooperative research project with the University of Alaska. It is designed to cover at least half of an 11 year sunspot cycle from the point of highest activity to the lowest.

skywave propagation curves reflecting a factor of 13 dB.[7] Also, the Commission's staff has refined the high latitude curves to improve their applicability to short paths (i.e., in Alaska). However, the refinement has virtually no effect on long paths from Alaska to the lower 48 states. From now on, the formulas from which these curves are derived are to be used for all skywave calculations involving one or more Alaskan AM stations regardless of class.[8] Thus, in doing single signal computations, the formula in Figure 1b is to be used to calculate the 10% values for both stations. In doing RSS calculations, Figure 1b is to be used in computing the RSS of a station in Alaska. For stations not in Alaska Figure 1b is to be used for computing the contributions from stations in Alaska.

13. *Level of Protection* Finally, we come to the issue of how best to protect the ability of these Alaskan stations to reach the people who depend on their service. The normally protected contours for Class I stations are the 0.1 mV/m groundwave contour daytime (0.5 mV/m groundwave contour nighttime) and the 0.5 mV/m 50% skywave contour nighttime. Although protecting the 0.1 mV/m groundwave contour will serve the function of ensuring the continuation of needed groundwave service, there are several problems with specifying protection to the normal skywave service contour. With the less efficient and lower powered operations involved here, especially using the high latitude curves, some of these stations will not even generate a 0.5 mV/m 50% skywave contour. If there is no skywave contour to protect, the commenting parties suggest protecting the 0.1 mV/m groundwave contour, but this by itself falls short of serving the vital needs of Alaska.

14. As we observed in the *Notice*, petitioners asserted that the lower noise levels in Alaska permit reception of low signal levels on the order of 0.1 mV/m or less which is subjectively equivalent to a 0.5 mV/m signal in the lower 48 states. The filings in this proceeding have documented this assertion. Not only can such lesser signals be received, they are depended on to provide weather bulletins and other vital information. In one case, a measured signal level of 0.072 mV/m was shown to provide fully satisfactory service. Unless some method is found for taking this into account, there will be no way to protect nighttime service for those living outside the 0.1 mV/m groundwave contour. Since in parts of Alaska night can last 24 hours in winter, this means the possibility of losing the only signal capable of providing warnings of severe weather. We will,

[7] The effect of this change is to show that the interfering 10% contour would extend further than if a 8 dB correction had been employed. This would lead to more effective protection for the skywave service of these Alaskan stations.

[8] However, it is not necessary to calculate signal levels from Hawaii to Alaska or vice versa as the great distance involved precludes the possibility of interference. For the same reason it has not been necessary to calculate signal levels to or from Hawaii and the lower 48 states.

therefore, adopt rules that will require that 0.1 mV/m 50% skywave contour to be protected.[9] In azimuths where the station does not develop a 0.1 mV/m 50% skywave signal, protection will be given to the 0.1 mV/m groundwave contour on an RSS basis. Even with the new curves, an efficiency of only 175 mV/m and a power of 10 kW would be sufficient to generate such a signal level which in Alaska has been shown to be sufficient for satisfactory reception.

15. Affording protection of the 0.1 mV/m 50% skywave contour in Alaska would establish a standard which is different from the one which is specified in the lower 48 states.[10] However, this level of protection is fully supported by the record and is quite consistent with the unique situation affecting Alaska. It recognizes both the need to rely on lower signal levels and the fact that at higher latitudes it is possible to do so. That being the case, we believe it appropriate to give full recognition to Alaska's special needs.[11] Likewise, although expanded skywave protection could have a preclusive effect, this is not a problem as Alaska would continue to have abundant opportunity to obtain new AM stations even with these greater limitations on establishing co-channel operations on these frequencies.

16. As indicated in the *Notice of Proposed Rule Making*, it appears appropriate to apply the new rules to applications filed during the pendency of this proceeding. In the event of a conflict, the applicant will be given a reasonable opportunity to amend the application as required.

17. Accordingly, IT IS ORDERED That Sections 73.22, 73.24, 73.25, 73.182, 73.185, 73.187, 73.189 and 73.190 ARE AMENDED effective, December 3, 1984, as set forth in the attached appendix.

18. Authority for this action is contained in Sections 4(i), 303 and 307(b) of the Communications Act of 1934, as amended.

Regulatory Flexibility Analysis

I. *Need for and purpose of the rule.*

The rule is designed to provide additional interference protection for AM stations in Alaska. Providing such protection helps assure the ability of these stations to reach outlying communities in Alaska which depend on the signals of these stations for weather warnings and other important information.

II. *Summary of issues raised by public comment in response to the initial regulatory flexibility analysis, Commission assessment, and changes made as a result.*

A. *Issues raised.*

[9] Such skywave protection has been shown to be needed at night, but because of the different propagation conditions in Alaska, daytime skywave protection is not required.

[10] However, there is no difference in the level of adjacent channel protection being afforded.

[11] Doing so includes providing the same level of protection from stations conducting pre-sunrise and post-sunset operations as is afforded other Class I stations.

As discussed in the body of the *Report and Order*, concern was expressed about the burden which would be imposed if these stations had to operate with improved antenna efficiency and high power in order to be eligible for the additional interference protection. The issue of antenna efficiency was the principal concern because of the problems involved in trying to build the taller towers required for greater antenna efficiency. Although some comment was directed to the issue of minimum power, there was general agreement about the appropriateness of the level proposed provided there was a grace period in which to achieve compliance.

B. *Assessment.*

The comments offered persuasive arguments against adopting the minimum antenna efficiency requirement which had been proposed. For many stations, construction of taller towers would be an impossibility. Even for those stations which could construct such towers, the burden in doing so would be excessive. As to the issue of requiring a minimum power, a grace period seems appropriate for those few stations not now at or above this level.

C. *Changes made as a result.*

Based on the record developed, the Commission has decided not to adopt the antenna efficiency requirement of 225 mV/m which had been proposed but to apply a lesser requirement of 175 mV/m instead. Also, in adopting the minimum power requirement, the Commission will allow the five-year grace period suggested by the petitioner.

III. *Significant alternative considered and rejected.*

The only alternative would have been to impose no power minimum, but without the level of power proposed and adopted, these stations would be unable to render the service for which they sought and received protection.

19. IT IS FURTHER ORDERED That this proceeding is terminated.

20. For further information concerning this proceeding, contact Jonathan David, Mass Media Bureau, (202) 632-7792 or Wilson La Follette, Mass Media Bureau, (202) 632-5414.

FEDERAL COMMUNICATIONS COMMISSION

WILLIAM J. TRICARICO, *Secretary*

Appendix

1. 47 CFR 73.22 is amended by revising paragraph (d)(1) to read as follows:

§73.22 Assignment of Class II-A stations.

* * * * *

(d)

(1) Protection by Class II-A stations to other stations. The co-channel Class I-A station shall be protected by the Class II-A station to its 0.1 mV/m contour daytime and its 0.5 mV/m 50 percent skywave contour nighttime. A co-channel Class I-N station shall be protected to its 0.1 mV/m contour daytime and its 0.1 mV/m 50% skywave contour nighttime. The 0.1 mV/m groundwave contour of a Class I-N station is to be protected in those azimuths in which the Class I-N station does not develop a 0.1 mV/m 50% skywave signal. All other stations of any class authorized on or before October 30, 1961, shall normally receive protection from objectionable interference from Class II-A stations as provided in §73.182.

* * * * *

2. 47 CFR 73.24 is amended by revising paragraph (h) to read as follows:

§73.24 Broadcast facilities; showing required.

* * * * *

(h) That, in the case of an applications for a Class II station, the proposed station would radiate, during two hours following local sunrise and two hours preceding local sunset, in any direction toward the 0.1 mV/m groundwave contour of a co-channel United States Class I-A or I-B station, no more than the maximum radiation values permitted under the provisions of §73.187.

* * * * *

3. 47 CFR 73.25 is amended by revising paragraph (a) to read as follows:

§73.25 Clear Channels: Classes I and II stations.

* * * * *

(a) On each of the following channels, one Class I-A station will be assigned, operating with power of 50 kW: 640, 650, 660, 670, 700, 720, 750, 760, 770, 780, 820, 830, 840, 870, 880, 890, 1020, 1030, 1040, 1100, 1120, 1160, 1180, 1200, and 1210 kHz. In Alaska, these frequencies can be used by Class I-N stations subject to the conditions set forth in Section 73.182(a)(i)(iii). In addition, on the channels listed in this paragraph, Class II stations may be assigned as follows:

* * * * *

4. 47 CFR 73.182 is amended by revising paragraphs (a)(1), (a)(1)(ii), and (a)(2); by adding new paragraph (a)(1)(iii) and a Note thereto; by revising paragraphs (i), (r), (s) and (t) and by revising the chart in paragraph (v) to read as follows:

§73.182 Engineering standards of allocation.

(a) * * *

(1) Class I stations are dominant stations operating on clear channels with powers of not less than 10 or more than 50 kW. These stations are designed to render primary and secondary service over an extended area and at relatively long distances, hence have their primary service areas free from objectionable interference from other stations on the same and adjacent channels and secondary service areas free from objectionable interference from stations on the same channels. (The secondary service area of a Class I station is not protected from adjacent channel interference. However, if it is desired to make a determination of the area in which adjacent channel groundwave interference (10 kHz removed) to skywave service exists, it may be considered as the area where the ratio of the desired 50% skywave of the Class I station to the undesired groundwave of a station 10 kc/s removed is 1 to 4.) From an engineering point of view, Class I stations may be divided into three groups and, hereafter, for the purpose of convenience, the three groups of Class I stations will be termed Class I-A, I-B or I-N in accordance with the assignment to channels allocated by §73.25 (a) or (b).

* * * * *

(ii) The Class I stations in group I-B are those assigned to the channels allocated by §73.25(b), on which duplicate operation is permitted, that is, other Class I or Class II stations operating unlimited time may be assigned to such channels. During nighttime hours of operation a Class I-N station is protected to the 100 uV/m 50 percent skywave contour and a Class I-B station of this group is protected to the 500

uV/m 50 percent skywave contour. During daytime hours of operation Class I-B and Class I-N stations are protected to the 100 uV/m groundwave contour from stations on the same channel. Protection is given to the 500 uV/m groundwave contour from stations on adjacent channels for both day and nighttime operation. The operating powers of Class I stations on these frequencies shall be not less than 10 kW nor more than 50 kW.

(iii) In Alaska there is a third group of Class I stations, designated as Class I-N. These stations operate on the channels allocated by Section 73.25(a) or Section 73.25(b) with a minimum power of 10 kW and antenna efficiency of 175 mV/m for 1 kW. Stations operating on these channels in Alaska which have not been designated as Class I-N stations in response to licensee request will continue to be considered as Class II stations. During daytime hours a Class I-N station receives protection to the 100 uV/m groundwave contour from co-channel stations. During nighttime hours a Class I-N station receives protection to the 100 uV/m 50% skywave contour from co-channel stations. Protection is given to the 500 uV/m groundwave contour from stations on adjacent channels for both day and nighttime operation.

Note: In the Report and Order in MM Docket No. 83-807, the Commission designated 15 stations operating on U.S. clear channels as Class I-N stations. Eleven of these stations already have Class I-N facilities and are to be protected accordingly. Permanent designation of the other four stations as Class I-N is conditioned on their constructing minimum Class I-N facilities no later than December 31, 1989. During this period, until such facilities are obtained, temporary designation as Class I-N stations shall be applied, and calculations involving these stations should be based on existing facilities but with an assumed power of 10 kW. Thereafter, these stations are to be protected based on their actual Class I-N facilities. If any of these stations does not obtain Class I-N facilities in the period specified, it is to be protected as a Class II station based on its actual facilities. These four stations may increase power to 10 kW without regard to the impact on Class II co-channel stations. However, increases by these stations beyond 10 kW (or by existing Class I-N stations beyond their current power level) are subject to applicable protection requirements for co-channel Class II stations. Other stations not on the original list but which meet applicable requirements may obtain Class I-N status by seeking such designation from the Commission. If a power increase or other change in facilities by a station not on the original list is required to obtain minimum Class I-N facilities, any such application shall meet the interference protection requirements applicable to a Class II proposal on the channel.

(2) Class II stations are secondary to stations which operate on clear channels with powers not less than 250 watts nor more than 50 kW, except that Class II-A stations shall not operate nighttime with less than 10 kW, and Class II-B stations coming within §73.21(a)(2)(ii)(C) shall not operate with nighttime power exceeding 1 kW. Class II stations are required to use directional antennas or other means to avoid causing interference within the normally protected service areas of Class I stations or other Class II stations. (For special rules concerning Class II-A stations, see §73.22.) These stations normally render primary service only, the area of which depends on the geographical location, power, and frequency. This may be relatively large but is limited by and subject to such interference as may be received from Class I stations. However, it is recommended that Class II stations be so located that the interference received from other stations will not limit the service area to greater than 2.5 mV/m groundwave contour nighttime and 0.5 mV/m groundwave contour

daytime, which are the values for the mutual protection of this class of stations with other stations of the same class. There are three exceptions:

(i) Class II-A stations are normally protected at night to the limit imposed by the co-channel Class I-A or Class I-N station;

(ii) Class II-B stations coming within §73.21(a)(2)(ii)(D) are normally protected at night to the limit imposed by the co-channel Class I-A or Class I-N station or the higher limit, if any, imposed by previously authorized facilities of other stations; and

(iii) Class II-B stations coming within §73.21(a)(2)(ii)(C) are normally protected at nighttime to their 10 mV/m groundwave contour, or the higher limit, if any, imposed by previously authorized facilities of other stations.

* * * * *

(i) Secondary service is delivered in the areas where the skywave for 50% or more of the time has a field strength of 0.5 mV/m or greater (0.1 mV/m in Alaska). It is not considered that satisfactory secondary service can be rendered to cities unless the skywave approaches in value the groundwave required for primary service. The secondary service is necessarily subject to some interference and extensive fading whereas the primary service area of a station is subject to no objectionable interference or fading. Class I stations only are assigned on the basis of rendering secondary service.

Note: * * *

* * * * *

(r) For the purpose of estimating the coverage and the interfering effects of stations in the absence of field strength measurements, use shall be made of Figure 8 of §73.190 which describes the estimated effective field for one kW power input of simple vertical omnidirectional antennas of various heights with ground systems of at least 120 one-quarter wavelength radials. Certain approximations, based on the curve or other appropriate theory, may be made when other than such antennas and ground systems are employed, but in any event the effective field to be employed shall not be less than given in the following:

Class of station	Effective field
I-A and I-B	225 mV/m
I-N	175 mV/m
II and III	175 mV/m
IV	150 mV/m

In case a directional antenna is employed, the interfering signal of a broadcasting station will vary in different directions, being greater than the above values in certain directions and less in others, depending upon the design and adjustment of the directional antenna system. To determine the interference in any direction the measured or calculated radiated field (unabsorbed field strength at 1 mile from the array) must be used in conjunction with the appropriate propagation curves. (See §73.185 for further discussion and solution of a typical directional antenna case.)

(s) The existence or absence of objectionable groundwave interference from stations on the same or adjacent channels shall be determined by actual measurements made according to the method described in §73.186, or, in the absence of such measurements, by reference to the propagation curves of §73.184. The existence or absence

of objectionable interference due to skywave propagation shall be determined by reference to the appropriate propagation curves in Figure 1a, 1b or Figure 2 of §73.190.

Note: * * *

(t) *Computation of Skywave Field Strength Values*: (1) *Fifty Percent Skywave Field Strength Values (Clear Channel)* In computing the fifty percent skywave field strength values of a Class I-A or I-B clear channel station, use shall be made of Figure 1a of §73.190 entitled "Skywave Signals for 10 percent and 50 percent of the time." In computing the fifty percent skywave field strength values of a Class I-N station (in Alaska), use shall be made of the formula for deriving such values included in Figure 1b of §73.190.

(2). *Ten Percent Skywave Field Strength Values (Clear Channel).* In computing the 10% skywave field strength for stations on clear channels on a single signal basis, the curve in Figure 1a should be used unless one or both of the stations being considered are in Alaska; in such a case, the formula included in Figure 1b should be used to calculate the 10% values for both stations. In computing the 10% skywave field strength for stations on clear channels on an RSS basis, this formula included in Figure 1b shall be used in computing the RSS of a station in Alaska. In computing the RSS of a station not in Alaska, the formula included in Figure 1b shall be used in computing the contribution from stations in Alaska, and the curve in Figure 1a shall be used in computing contributions from stations not in Alaska.

(3). *Regional and Local Channels.* In computing the 10% skywave field strength values for stations on a regional channel, on an RSS basis, the formula included in Figure 1b shall be used in computing the RSS of a station in Alaska. In computing the RSS of a station not in Alaska, the formula included in Figure 1b shall be used in computing the contribution from stations in Alaska, and the curve in Figure 2 shall be used in computing contributions from stations not in Alaska. (In the case of Class IV stations on local channels, simplifying assumptions may be made. See Note paragraph (a) (4) of this section.)

(4). *Determination of Angles of Departure.* In calculating skywave field strength for stations on all channels, the pertinent vertical angle shall be determined by use of Figure 6a of §73.190, entitled "Angles of Departure vs. Transmission Range."

(5). *Calculations involving Hawaii.* In performing the calculations under (2) and (3) above, it is not necessary to consider the effect of stations in Hawaii on stations on the mainland (including Alaska) or vice versa, as the distances involved preclude the possibility of interference.

Note: * * *

* * * * *

(v) * * *

I-A * * *

I-B * * *

I-N	do	50 kW SC 100 uV/m SC 100 uV/m 5 uV/m 5 uV/m AC 500 uV/m AC 500 uV/m

II-A * * *

* * * * *

5. 47 CFR 73.185 is amended by revising paragraphs (b), (c), (d), (e) and (f) to read as follows:

§73.185 Computation of interfering signal.

* * * * *

(b) For signals from stations operating on clear channels, skywave interference shall be determined from Figures 1a (or 1b) and 6a of §73.190.

(c) For signals from stations operating on regional and local channels, skywave interference is determined from Figures 2 and 6a of §73.190, unless one or both stations are in Alaska, in which case Figures 1b and 6a of §73.190 are employed. (Certain simplifying assumptions may be made in the case of Class IV stations on local channels. See Note to §73.182(a)(4).)

(d) Figure 6a of §73.190, entitled "Angles of Departure vs. Transmission Range" is to be used in determining the angles in the vertical pattern of the antenna of an interfering station to be considered as pertinent to transmission by one reflection. To provide for variation in the pertinent vertical angle due to variations of ionosphere height and ionosphere scattering, the curves 4 and 5 indicate the upper and lower angles within which the radiated field is to be considered. The maximum value of field strength occurring between these angles shall be used to determine the multiplying factor to apply to the 10 percent skywave field strength value read from Figure 1a, Figure 1b or Figure 2 of §73.190. The multiplying factor is found by dividing the maximum radiation between the pertinent angles by 100 mV/m. (Curves 2 and 3 are considered to represent the variation due to the variation of the effective height of the E-layer while Curves 4 and 5 extend the range of pertinent angles to include a factor which allows for scattering. The dotted lines are included for information only.)

(e) Example of the use of skywave curves for stations operating on clear channels: Assume a Class II station with which interference may be expected is located at a distance of 450 miles from a proposed Class II station. The critical angles of radiation as determined from Figure 6a of §73.190 are 9.6° and 16.3°. If the vertical pattern of the antenna of the proposed station, in the direction of the other station, is such that between the angles of 9.6° and 16.3° above the horizon the maximum radiation is 160 mV/m at 1 mile, the value of the 10 percent field, as read from Figure 1a of §73.190, is multiplied by 1.6 to determine the interfering field strength at the location in question. For calculations involving Class I-N stations Figure 1b is employed instead of Figure 1a.

(f) For stations operating on regional and local channels, interfering skywave field strengths shall be determined in accordance with the procedure specified in paragraph (d) of this section and illustrated in paragraph (e) of this section, except that Figure 2 of §73.190 is used in place of Figure 1a or 1b of §73.190. In using Figure 2 of §73.190, one additional parameter must be considered, i.e., the variation of received field with the latitude of the path.

* * * * *

6. 47 CFR 73.187 is amended by revising paragraph (a) to read as follows:

§73.187 Limitation on daytime radiation.

(a)(1) Except as otherwise provided in paragraphs (a)(2) and (3) of this section, no authorization will be granted for Class II facilities if the proposed facilities would radiate during the period of critical hours (the two hours after local sunrise and the two hours before local sunset) toward any point on the 0.1 mV/m contour of a co-channel U.S. Class I-A or I-B station, at or below the pertinent vertical angle determined from Curve 4 of Figure 6a of §73.190, values in excess of those obtained as provided in paragraph (b) of this section.

(2) The limitation set forth in paragraph (a)(1) of this section shall not apply in the following cases:

(i) Any Class II facilities authorized before November 30, 1959; or

(ii) For Class II stations authorized before November 30, 1959, subsequent changes of facilities which do not involve a change in frequency, an increase in radiation toward any point on the 0.1 mV/m contour of a co-channel U. S. Class I-A or I-B station, or the move of transmitter site materially closer to the 0.1 mV/m contour of such Class I-A or I-B station.

(3) If a Class II station authorized before November 30, 1959, is authorized to increase its daytime radiation in any direction toward the 0.1 mV/m contour of a co-channel Class I-A or I-B station (without a change in frequency or a move of transmitter site materially closer to such contour), it may not, during the two hours after local sunrise or the two hours before local sunset, radiate in such directions a value exceeding the higher of:

(i) The value radiated in such directions with facilities last authorized before November 30, 1959, or

(ii) The limitation specified in paragraph (a)(i) of this section.

* * * * *

7. 47 CFR 73.189 is amended by revising paragraph (b)(2)(iii) to read as follows:

§73.189 Minimum antenna heights or field strength requirements.

* * * * *

(b) * * *

* * * * *

(2) * * *

* * * * *

(iii) Class I-A and I-B stations, a minimum effective field strength of 225 mV/m for 1 kW, for Class I-N stations, a minimum effective field strength of 175 mV/m for kW.

* * * * *

8. 47 CFR 73.190 is amended by adding a new chart designated as figure 1b, and by revising the section text to read as follows:

§73.190 Engineering charts.

This section consists of the following figures: 1, 1a, 1b, 2, R3, 5, 6, 6a, 7, 8, 9, 10, 11, and 12.

Note: The charts as reproduced herein, due to their small scale, are not to be used in connection with material submitted to the FCC.

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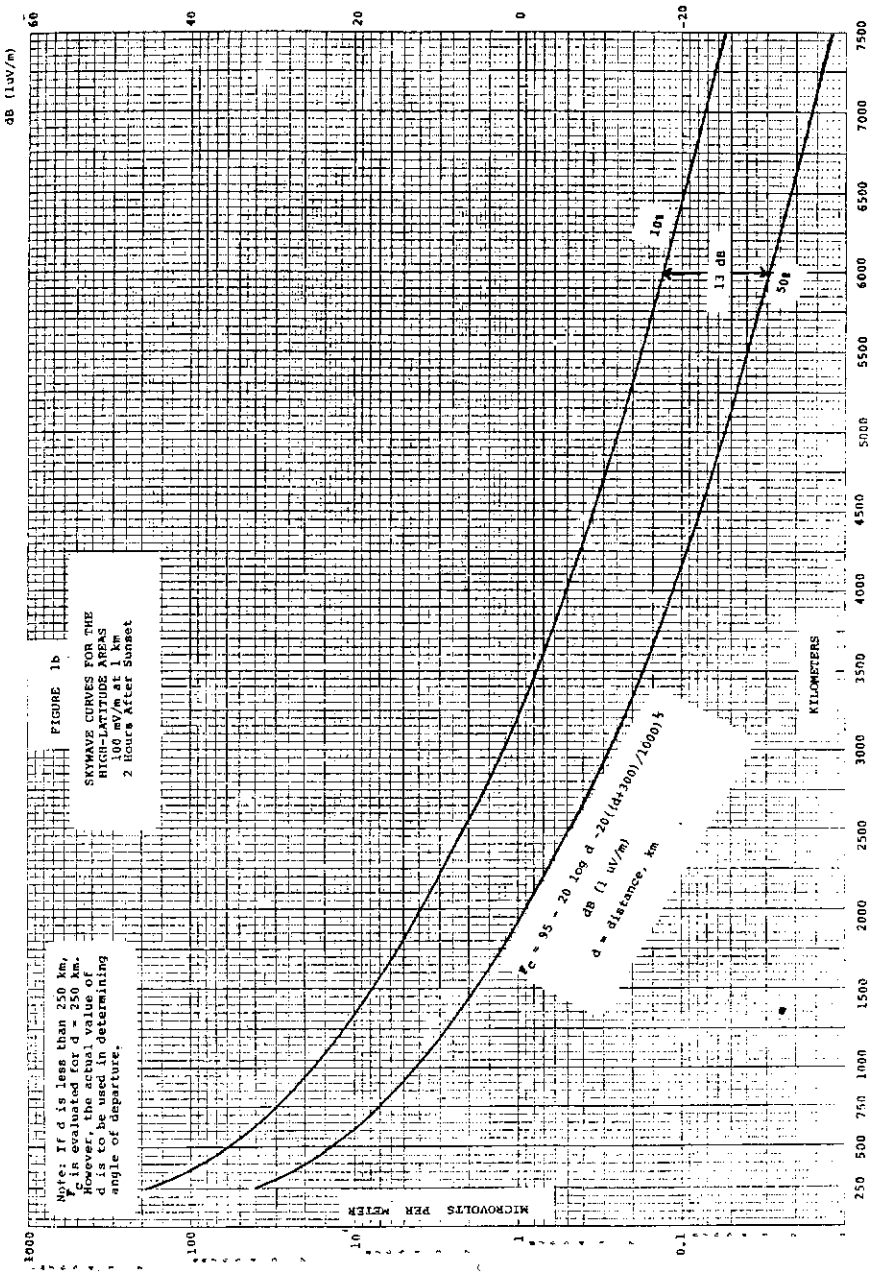
dB (1uV/m)
MICROVOLTS PER METER
KILOMETERS
FIGURE 1b
SKYWAVE CURVES FOR THE HIGH-LATITUDE AREAS 100 mV/m at 1 km 2 Hours After Sunset
Note: If d is less than 250 km, E is evaluated for d = 250 km. However, the actual value of d is to be used in determining angle of departure.
Ec = 95 - 20 log d -20((d+300)/1000)
dB (1 uV/m)
d = distance, km
10a
13 dB
50a