

Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
Washington, D.C. 20544

FCC 85-590  
36190

In the Matter of ) MM Docket No. 85-90  
)  
AM Broadcast Directional )  
Antenna Sampling Systems and )  
Proof of Performance Field )  
Strength Measurements )  
)

REPORT AND ORDER

(Proceeding Terminated)

Adopted: October 31, 1985 ; Released: November 5, 1985

By the Commission:

INTRODUCTION

1. We have before us a Notice of Proposed Rule Making (Notice), 50 Fed. Reg. 13994 (April 9, 1985), proposing revision of Sections 73.61 and 73.68 of the Commission's Rules and Regulations. The Notice requested comments on the continuing need for required partial and skeleton proofs of performance and antenna monitoring point measurements for directional antenna (DA) systems. Specifically, the Notice proposed elimination of the requirement that skeleton proofs be performed and that licensees be given the freedom and responsibility to schedule partial proof and field monitoring measurements as needed. In addition, the Notice solicited comments as to what extent Section 73.68, Sampling systems for antenna monitors, should be deregulated.

BACKGROUND

2. The Commission's authorization requirements provide that AM stations may use DA systems to prevent interference that could otherwise occur with non-directional operation. To assure that a directional antenna continues to perform properly over time, Paragraph 73.61(b) of the Rules now requires a station that uses a DA system to perform field strength measurements on a regularly scheduled basis. These measurements, when combined and analyzed, are called a proof of performance (proof).

3. There are three types of DA proof of performance measurements. In all cases, the proofs consist of measurements of signal strength at numerous locations, typically up to 20 miles from the transmitter. The proofs differ primarily in the number of measurements required. The first, the full proof, is required of all DA stations when the antenna is first constructed and when it is extensively modified. The second measurement, the partial proof, is required for most stations once each third year and also if the DA undergoes minor system repairs. This measurement is used to determine if there have been changes in the system operation since its initial construction. The

third measurement, the skeleton proof, is required of certain DA stations during the intervening years that the partial proof is not made. This measurement essentially produces a "spot" check of DA system operation.

4. Currently, about 80 percent of the AM licensees operating DA systems are required to perform partial proofs triennially and 25 percent of that number are further required to perform intervening annual skeleton proofs. Additionally, about a third of these stations are required to make field measurements at designated locations called monitoring points (MP). These MPs are specified in the station license. MPs provide trend information for possible changes in the antenna pattern in the directions of those stations being protected from interference.

5. Besides the MP and proof of performance measurements, the operation of a DA system can be observed by monitors at the transmitter site, that indicate the relative amplitudes and phases of the electric currents in each of the towers of the directional array. The Rules contain detailed specifications for the design and construction of such on-site antenna monitoring (sampling) systems. Because the existing regulations (Sections 73.61 and 73.68) are costly, time consuming, burdensome, and allow licensees little freedom to implement new technology, the Notice invited comments on modifying or deleting these rules. Parties submitting comments in this proceeding are listed in Appendix A of this document.

#### ISSUES

6. The Notice addressed the following issues:

- 1) Is there a continuing need for a required schedule of partial and skeleton proof of performance and antenna monitoring point measurements?
- 2) Is there a need to retain specific design criteria in the Rules for on-site DA parameter monitoring systems?

Each issue will be discussed separately.

#### DISCUSSION

##### Issue 1: Continuing Need for Proofs and Monitoring Point Measurements

7. Skeleton Proofs. In the Notice, we proposed to eliminate the requirement that skeleton proofs be performed because of their limited value in showing actual antenna performance. The commenters were unanimously supportive of our proposal on elimination of these proofs. In general, they indicated that the three measurements made on each radial (specific bearing direction from the antenna site along which measurements are made) are too few for any meaningful analysis of the antenna performance. They added that skeleton proofs provide information of no greater value than normal monitoring point measurements. NBC commented that "skeleton proofs are virtually worthless." In short, the record supports our proposal in the Notice. Therefore, the Rules are amended to remove all requirements for skeleton proof of performance measurements and related retention of records.

8. Partial Proofs. The Notice acknowledged the continuing need for periodic partial proof of performance measurements, but recommended that the licensees determine the most appropriate schedule based on need. The comments were divided on this issue, with the majority of the commenters favoring an elimination of the fixed schedule for conducting partial proofs.

9. The comments from NAB, du Triel, and McDonnell agreed with the Commission's proposal and indicated that the partial proof serves little purpose unless there has been some change in the AM antenna itself that might alter the antenna's radiation characteristics. CBS in its reply comments also supported this position. AFCCE commented that the periodic partial proofs could serve a useful purpose only when used with other indicators (i.e. to confirm the continued correctives of the sampling system indications).

10. NBC and Jones on the other hand, stated that the Commission should continue to establish the necessary intervals for partial proofs "because some directional arrays may well operate out of adjustment for considerable lengths of time without the Commission being made aware of this fact."

11. Finally, we note that Lahm submitted a unique approach in the form of an objective equation that would determine the "sensitivity" or tendency of an antenna system to drift out of adjustment. He further suggested a three, five, or seven year schedule of partial proof measurements based on such a calculated sensitivity factor of the antenna.

12. The comments, in general, supported the elimination of the required periodic partial proofs as proposed. Therefore, we are persuaded that the scheduling of partial proofs should be the responsibility of the licensee, and the Rules will be amended as proposed. The Commission, however, retains the authority to require that proofs of performance be made by licensees whenever there is a question of stability in directional antenna systems. With regard to the Lahm proposal, we believe it is best to leave the choices to licensees of how to determine the proper interval between measurements.

13. Monitoring Point Measurements. The Notice proposed to allow stations to conduct field MP measurements on a schedule determined by the licensee. Although field MP measurements are closely related to partial proof of performance measurements, they are far less burdensome. Partial proofs require measurements at a large number of locations; whereas MP measurements are made only at a few, close-in, selected locations. (Prior to our discussion of the comments on the required periodic field MP measurements, we would like to reiterate at this juncture, that only directional antenna stations with non-approved sampling systems (approximately 25 percent of DA-AM stations) are now required to conduct MP's on a fixed schedule. Stations with approved sampling systems can establish their own schedule of MP measurements.)

14. In their comments, NAB, AFCCE, and NBC urged retention of field MP measurements, stating that these measurements serve as good checks for the DA pattern and as a "backup" for determining proper operation. Lahm commented that MP measurements should be retained because they provide an incentive for AM stations operating with non-approved sampling systems to upgrade to a system with better accuracy. McDonnell agreed and maintained that MP measurements are not a burden and should be retained. Conversely, du Triel

stated that MP measurements are not needed because they are generally inaccurate due to weather and seasonal changes, as well as new construction in the proximity of the MP location. Jones suggested retention of a required schedule, but a relaxation of the frequency of MP measurements to reduce the amount of time and work required.

15. After careful review of the comments, and in light of the elimination of the required schedule for partial proof measurements, we believe that some required schedule of field MP measurements is necessary for stations employing existing sampling systems of questionable reliability. This will provide the necessary backup to assure that the radiation patterns are maintained. However, we see no need to continue to require MP measurements on weekly or monthly intervals. Therefore, we are relaxing the Rules to allow for required MP measurements on a quarterly basis for those stations without approved antenna sampling systems.

#### Issue 2: Sampling Systems

16. In the Notice, the Commission solicited comments as to what extent the requirements of Section 73.68 should be relaxed. The consensus of the parties commenting was that a stable and reliable antenna monitor sampling system is essential to ensure reliable DA operation. However, the comments were mixed on the extent and necessity for design and construction guidance for sampling systems.

17. NAB, McDonnell, and Jones recommended, at a minimum, retention of the existing sampling system specifications. Jones stated that "the use of better sampling systems, plus the use of type accepted antenna monitors, has done more to improve the stability and compliance of DA licensees than anything else in recent years."

18. On the other hand, AFCCE commented that any rule that can ensure correlation, stability, and long-term reliability, is sufficient. Lahm stated that, "technology-specific" (construction-oriented) regulations are inappropriate in this era of rapid technological progress. NBC commented that the specific makeup of the monitoring system is far less relevant than its performance. All of the commenters agreed that the rules should be modified to accommodate advances in technology. They also unanimously agreed with the Notice that the quality of a sampling system is extremely important to maintain a day-to-day watch on DA performance, and thus prevent interference.

19. The Commission concludes after review of the comments that it is the performance, and not the specific makeup of the sampling systems that help maintain parameters of the DA system, thus preventing an increase in interference in the AM band. Therefore, we will no longer require specific equipment for sampling systems, but instead will approve any system based on

the licensee's stability analysis showing that the selected system is capable of providing accurate signals to the antenna monitor. <sup>1/</sup> To accommodate technological advances, we will allow other forms of sampling systems that can be demonstrated to be accurate and stable. Accordingly, we will amend the Rules to indicate the above changes.

#### Other Matters

20. Several parties suggested changes in the Rules, that were not specifically addressed in the Notice. However, they do relate directly to the rule amendments under consideration. McDonnell requested that references to the use of graphical analysis for partial proof data be removed because it is no longer used and has been superseded by the mathematical analysis. He also suggested that the partial proof analysis in Section 73.186 be combined with the partial proof information in Section 73.154 to consolidate the Rules. We agree to these changes and will so amend the Rules.

21. In their comments, both Lahm and du Treil suggested alternate methods for conducting and analyzing partial proof measurements. One of the methods which they suggested would entail making partial proof measurements with the stations antenna operating in directional and non-directional modes. They stated that the results of these measurements, when analyzed, would nullify the effects of ground conductivity changes (distance the groundwave portion of an AM signal will travel), and thus would provide a better indication of DA operation. In addition, these commenters recommended that partial proof requirements include only certain radials (e.g. near the minor radiation lobes). They stated that this could save the amount of measurement work by 25-50 percent. Upon review, the Commission agrees that conductivity changes from the original values are important in determining whether the antenna system continues to provide the required interference protection. However, making it mandatory to conduct both non-directional and directional proof measurements for all licensees would be unnecessarily burdensome for DA stations located in areas where conductivity changes are negligible. Further, the reliance of the partial proof on a few selected radials will not provide an accurate assessment of whether the antenna is in proper adjustment. In view of this, we are not adopting the suggested procedure changes.

22. Finally, as proposed in the Notice, we will amend the Rules in Section 73.14 to clarify the definition of "critical directional antenna" and to amend the requirements for authorization of antenna monitors.

#### FINAL REGULATORY FLEXIBILITY ANALYSIS

##### I. Need and purpose of this action:

Certain AM stations using directional antenna systems are currently

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<sup>1/</sup> In the near future, the Mass Media Bureau will issue a policy statement containing the general criteria upon which antenna sampling systems will be approved.

required to make periodic DA field strength and proof of performance measurements. These regulations are not based on the stations' potentials for causing interference. The amendments adopted here are needed to relieve licensees from excessive and costly measurement procedures that are not necessary to control interference.

II. Summary of issues raised by the public comments in response to the Initial Regulatory Flexibility Analysis:

No issues were raised other than those discussed above.

III. Significant alternatives considered and rejected:

The Commission considered all the alternatives presented in the Notice and all the timely filed comments directed to the various issues in the Notice. After carefully weighing all comments and suggested alternatives, the Commission is adopting the most reasonable course of action consistent with the mandate of the Communications Act to provide an efficient communications service to the public.

PAPERWORK REDUCTION ACT STATEMENT

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

ACTIONS

24. The Secretary shall cause a copy of this Report and Order, including the Final Regulatory Flexibility Analysis, to be sent 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. 601 et seq., (1981)).

25. Accordingly, IT IS ORDERED, pursuant to the authority contained in Section 4(i) and 303 of the Communications Act of 1934, as amended, that Part 73 of the Commission's Rules IS AMENDED, effective January 1, 1986, as set forth in the attached Appendix.

26. IT IS FURTHER ORDERED that this proceeding is TERMINATED.

27. Further information on this proceeding may be obtained by contacting John W. Reiser, Mass Media Bureau, (202) 632-9660.

FEDERAL COMMUNICATIONS COMMISSION

William J. Tricarico  
Secretary

Attachments: Appendix A  
Appendix B

APPENDIX AList of CommentersInitial Comments

Association of Federal Communications Consulting Engineers (AFCCE)

Cohen and Dippell, Consulting Engineers (C&D)

Doug C. McDonell, Engineering Consultant (McDonell)

du Treil-Rackley, Consulting Engineers (du Treil)

Karl D. Lahm, P.E. (Lahm)

National Association of Broadcasters (NAB)

National Broadcasting Company, Inc. (NBC)

Robert A. Jones, Consulting Engineers (Jones)

Radio Station WNQM-AM (WNQM)

Reply comments

CBS, Incorporated (CBS)

du Treil

Lahm



at those points does not exceed the values specified in the station authorization. Additionally, stations not having an approved sampling system must make the measurements once each calendar quarter at intervals not exceeding 120 days. The provision of this paragraph supersedes any schedule specified on a station license issued prior to January 1, 1986. The results of the measurements are to be entered into the station log pursuant to the provisions of §73.1820.

(b) Partial proof of performance measurements using the procedures described in §73.154 must be made whenever the licensee has reason to believe that the radiated field may be exceeding the limits for which the station was most recently authorized to operate.

(c) A station may be directed to make a partial proof of performance by the FCC whenever there is an indication that the antenna is not operating as authorized.

5. 47 CFR 73.68 is amended by revising paragraphs (a), (b), and (c); removing paragraph (d) in its entirety; and redesignating paragraphs (e) and (f) as (d) and (e) to read as follows:

§73.68 Sampling systems for antenna monitors.

(a) Each AM station permittee authorized to construct a new directional antenna system, must install the sampling system in accordance with the following specifications:

(1) Devices used to extract or sample the current and the transmission line connecting the sampling elements to the antenna monitor must provide accurate and stable signals to the monitor (e.g., rigidly mounted and non-rotatable loops and all system components protected from physical and environmental disturbances).

(2) Sampling lines for critical directional antennas (see §73.14) must be of uniform length. Sampling lines for non-critical directional antennas may be of different lengths provided the phase difference of signals at the monitor are less than  $0.5^\circ$  between the shortest and longest cable lengths due to temperature variations to which the system is exposed.

(3) Other configurations of sampling systems may be used upon demonstration of stable operation to the FCC.

(b) A station having an antenna sampling system constructed according to the specifications given in paragraph (a) of this section, may obtain approval of that system by submitting an informal request to the FCC in Washington, D.C. The request for approval, signed by the licensee or authorized representative, must contain sufficient information to show that

A P P E N D I X B

47 CFR Part 73 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. 47 CFR 73.14 is amended by revising the definition of Critical directional antenna to read as follows:

§73.14 AM broadcast definitions.

\* \* \* \* \*

Critical directional antenna. An AM broadcast directional antenna that is required, by the terms of a station authorization, to be operated with the relative currents and phases within the antenna elements at closer tolerances of deviation than those permitted under §73.62 and observed with a high precision monitor capable of measuring these parameters.

\* \* \* \* \*

3. 47 CFR 73.53 is amended by adding new paragraph (c) to read as follows:

§73.53 Requirements for authorization of antenna monitors.

\* \* \* \* \*

(c) A station determined to have a critical directional antenna must use an antenna monitor having high tolerance characteristics determined on an individual basis, and specified on the station authorization. Such monitors are not subject to the authorization of paragraph (a), however they may be used only at the station for which they were specified.

4. 47 CFR 73.61 is amended in its entirety to read as follows:

§73.61 AM directional antenna field strength measurements.

(a) Each AM station using a directional antenna must make field strength measurements at the monitoring point locations specified in the instrument of authorization, as often as necessary to ensure that the field

the sampling system is in compliance with all requirements of paragraph (a).

(c) In the event that the antenna monitor sampling system is temporarily out of service for repair or replacement, the station may be operated, pending completion of repairs or replacement, for a period not exceeding 120 days without further authority from the FCC if all other operating parameters and the field monitoring point values are within the limits specified on the station authorization.

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6. 47 CFR 73.69 is amended by revising paragraph (b) to read as follows:

§73.69 Antenna monitors.

\* \* \* \* \*

(b) In the event that the antenna monitor sampling system is temporarily out of service for repair or replacement, the station may be operated, pending completion of repairs or replacement, for a period not exceeding 120 days without further authority from the FCC if all other operating parameters, and the field monitoring point values are within the limits specified on the station authorization.

\* \* \* \* \*

7. 47 CFR 73.154 is revised in its entirety to read as follows:

§73.154 AM directional antenna partial proof of performance measurements.

(a) A partial proof of performance consists of at least 10 field strength measurements made on each of the radials established in the latest complete proof of performance of the directional antenna system.

(b) The measurements are to be made within 2 to 10 miles (3 to 16 kilometers) from the center of the antenna array. When a monitoring point as designated on the station authorization is on a particular radial, one of the radial measurements must be made at that point.

(c) The results of the measurements are to be analyzed in either of two methods. Either the arithmetic average or the logarithmic average of the ratios of the field strength at each measurement point along each radial to the corresponding field strength in the most recent complete proof of performance may be used to establish the inverse distance fields. (The logarithmic average for each radial is the antilogarithm of the mean of the

logarithms of the ratios of field strength (new to old) for each measurement location along a given radial.)

(d) The result of the most recent partial proof of performance measurements and analysis is to be retained in the station records available to the FCC upon request.

8. 47 CFR 73.186 is amended by removing paragraph (a)(5) and redesignating paragraph (a)(6) as (a)(5).

9. 47 CFR 73.1225 is amended by revising the introductory text of paragraph (c)(1)(iv) to read as follows:

§73.1225 Station inspections by FCC.

\* \* \* \* \*

(c)(1) \* \* \*

\* \* \* \* \*

(iv) Copy of the partial directional antenna proofs of performance made in accordance with §73.154 and made pursuant to the following requirements:

(A) \* \* \*

\* \* \* \* \*