

Before the  
Federal Communications Commission  
Washington, D. C.

In the Matter of )  
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Revitalization of the AM Radio Service ) MB Docket 13-249  
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Comments of  
Hatfield & Dawson Consulting Engineers, LLC

The consulting engineering firm of Hatfield & Dawson submits these comments in response to the October 31, 2013 Notice of Proposed Rulemaking, in which the Commission solicited comment on six specific matters, and invited submissions and /or comments on further proposals to improve the circumstances of the AM broadcasting service.

Hatfield & Dawson is pleased that the Commission has undertaken this effort and upon review of the proposals outlined in the NPRM, believe that they should be adopted. The experience in AM broadcast matters of the firm and it's predecessor practice, extending from the 1930s, provides what we believe to be a valuable perspective.

The Commission's Proposals:

A. OPEN FM TRANSLATOR FILING WINDOWS EXCLUSIVELY FOR AM LICENSEES AND PERMITTEES.

The history of FM translators used for supplementing and even extending AM broadcast station service is much more extensive than generally realized, since they have been licensed on a waiver basis in Alaska for decades. In the spectrum allocation conditions in Alaska suitable frequencies were never in short supply. But in much of the area of U.S. the competition for FM spectrum is severe, stemming from Docket 80-90, from translator licensing, and LPFM licensing. Therefore even the possibility of an "AM translator filing window" will almost surely not meet demand from AM station licensees. Therefore although we support the Commission's proposal in large part, we do not feel that this will be more than a "band-aid" provision.

The one area of the Commission's proposal that we believe requires modification is the restriction of the 60 dBμ contour of the translator to be enclosed in "the smaller of a 25-mile radius from the AM station's transmitter site, or the AM station's daytime 2 mV/m contour." This is unnecessarily restrictive for a station

which has radiation restrictions that do not allow it to provide coverage to a natural market. We recommend a rule which allows the 60 dB $\mu$  contour of the translator to extend to at least the 25 km (not miles) radius from the AM transmitter site without regard to the AM station's daytime coverage limitations.

#### B. & C. MODIFY DAYTIME AND NIGHTTIME COMMUNITY COVERAGE STANDARDS FOR EXISTING AM STATIONS

As will be outlined in our further comments, we believe that the "community coverage" requirements of the Commission's rules are entirely inappropriate in the context of the 21<sup>st</sup> century demographic circumstances of the United States, and should simply be eliminated. Even when these requirements were first adopted they were difficult to justify based on the totally disparate state government rules about city incorporation, expansion, and annexation. And, of course, some early AM stations were licensed to "communities" that did not meet the rule requirement. (Brooklyn, NY and Hollywood, CA being good examples.) The local government rules of Alaska, for example, where there are some cities which are coextensive with the extensive boroughs (counties), and the circumstances of New York and New England townships have always required either rule waivers, or "special circumstance" considerations, or outright glossing over the problem by the Commission staff.

#### D. ELIMINATE THE AM "RATCHET" RULE

As one of the original petitioners in RM-11560, we of course fully support the elimination of this rule which, although waived by the staff in hardship cases where the facilities change was prompted by circumstances beyond the licensee's control, has (to our knowledge) never been waived where the facilities change would involve a power increase or similar attempt to improve service even in such hardship cases.

The rule in many cases has provided very little benefit. Reduction of 10% of the signal of a contributor who was just at the 50% RSS contribution level results in a theoretical reduction of that 50% RSS of less than 1 dB, and depending on other contributions may result in a reduction of the 25% RSS of only hundredths of a dB.

And its effect may be counterproductive or at least administratively awkward. In one case, a class A (formerly I-B) station desired to change its theoretical pattern to provide some null fill, permitted by the Docket 87-267 changes in the skywave propagation calculation methods. As the result of a pending window application in the direction of the Class A station's directional pattern major lobe, it would have been required to reduce power 10%. It withdrew the application for a minor change of the antenna standard pattern, and filed a license application with augmentations to accomplish the desired null fill instead.

E. PERMIT WIDER IMPLEMENTATION OF MODULATION DEPENDENT CARRIER LEVEL CONTROL TECHNOLOGIES

In our firm's international work, we became aware of the benefits of MDCL techniques in the 1980s, as modern transmitter use became widespread. When high power costs in remote areas of Alaska began to seriously impact AM station operations there, we prepared the original waiver requests for MDCL testing, and the later request for a general rule waiver for Alaska stations which led to the Commission's "MDCL Public Notice." 26 FCC Rcd 12910. The benefits of MDCL operation are tautological, and extensive use by our clients and many others has not disclosed any detriments. We therefore support the proposed amendment of the rules.<sup>1</sup>

F. MODIFY AM ANTENNA EFFICIENCY STANDARDS

The minimum efficiency rule, together with the related minimum height graph of Figure 7 of 73.190, are another anachronistic artifact of the 1930s attempts to provide service as widely as possible but minimize interference caused by high angle radiation from short antennas. They really became irrelevant when the proliferation of daytime-only stations after WW II took place, since they aren't meaningful for daytime groundwave operation of stations. And although there was a minimum efficiency requirement in the NARBA agreements, the current Region II "RJ-86" agreement and the bilateral agreements with Canada and Mexico do not contain such a requirement. (Nor does the Region I and II GE-75 agreement.) The minimum ground radial requirement and the FCC "figure 8" ground system derating formula and graph are related to the minimum efficiency requirement, and are based on incorrect assumptions from flawed 1930s science. All of these anachronisms should be removed from the rules. AM antenna systems should be authorized based on inverse distance field values calculated by appropriate engineering methods. A minimum allocation value could be required, to prevent proliferation of very low effective radiated power stations, but licensees should be allowed to use antennas of lower efficiency if desired, generally due to the constraints of site availability and local land use restrictions.

FURTHER PROPOSALS TO IMPROVE AM BROADCASTING

The Commission should extend this rulemaking by a Further Notice to allow consideration of a large number of additional matters involving the AM service.

The basic considerations were well described in th 1986 Staff "Report on the

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<sup>1</sup> See NRSC-G101 "AM Modulation-Dependent Carrier Level (MDCL) Usage Guidelines" April, 2013.

Status of the AM Broadcast Rules” but were entirely misinterpreted if not outright subverted by the actions taken in the Docket 87-267 rulemaking.<sup>2</sup>

#### ALLOCATION RULE MATTERS:

##### Day:

1. Protected service should be based on noise level - 1 mV/m if not 2 mV/m groundwave for all classes of stations. The really significant problem for AM stations is NOT interference, it is the vastly increased electrical noise level ever since rural electrification and not just in urban areas, although, of course, they are the worst case. The modern use of switching power supplies and of computers and modern computer controlled devices of every sort has merely exacerbated the problem. This is why many countries have higher power limits than the U.S., and why Canada allowed more than 5 kW for stations on regional channels long before the adoption of RJ-81 Agreement finally allowed it.
2. While the 20:1 cochannel ratio may be justified, 2:1 adjacent channel ratio cannot be justified given the characteristics of modern receivers so return to 0 dB rule.<sup>3</sup>
3. The second adjacent channel ratio 1:1 at the 5 mV/m contour should also be revisited and revised to a 25 mV/m overlap rule.
4. The third adjacent channel limitation should be eliminated, as has been done in several if not most other countries, and has never been applied in ITU Regions I and III. (The RJ-81 Agreement and the U.S./Canada third adjacent channel restrictions only apply in trans-border cases, and the U.S. Mexico agreement has no third adjacent channel restriction.)

##### Night:

1. The actual 50% RSS calculated with 10% time incoming skywave signals should be used to determine the NIF of all stations, based on calculation at the contour (“clipping” analysis) or the calculated groundwave signal at locations within the NIF on a 20:1 basis, cochannel only. This would allow the site-to-site contribution to be greater than the value at the actual NIF contour, since the desired signal is higher inside that contour than at its periphery.
2. An increase in signal to an existing RSS where the incoming signal already

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<sup>2</sup> “Report on the Status of the AM Broadcast Rules,” Staff of the Mass Media Bureau, April, 1986

<sup>3</sup> see the NPR labs report “Consumer Testing of AM Broadcast Transmission Bandwidths and Audio Performance Measurements of Broadcast AM Receivers” 9/8/2006 and the consequent “NRSC R101” 12/2006.

contributes should be acceptable if it does not increase the RSS by more than 0.5 dB as is the case in Regions I and III.

3. Skywave signal contributions to possible RSS calculations should be done at two hours past sunset at the path midpoint as is now the case.

4. Class A stations should have protection only to their 1 (or possibly 2) mV/m groundwave contour but based on an RSS rather than single signal. (This is now the case for some international situations per the Rio Agreement.) It is preposterous to protect class A stations' skywave contours when some have actual RSS limitations at their sites or at their groundwave protected contours that are as high as 4 or 5 mV/m.

5. Given the known narrowband limitations of AM receivers and directional antennas, the utopian use of first adjacent channel contributions to the nighttime RSS should be eliminated.

6. Eliminate the "Alaskan Class A" status and provide protection to those stations only as in item 4 above.

7. Nighttime first- and second-adjacent channel groundwave protection should be based on 1:1 ratio (received and caused) at the 50% RSS NIF contour.

#### Other Allocation Matters:

The expanded band was originally allocated with distance spacing rules which have proven to be inflexible for stations already authorized in that band, and for those which might elect to move to the band. The allocation rules should be modified to be the same as for the original AM band. NTIA should be required to modify the co-primary status of Federal TIS stations on 1610 kHz so this frequency could be used by AM broadcast stations, which is not now the case. Additionally, 530 kHz should be added to the AM band for class B station use, as it is already in use by neighboring countries.

#### OTHER MATTERS

1. Daytime skywave analysis ("critical hours" or "Canadian Restricted") should be performed using proper hourly weighting of the Wang formula.<sup>4</sup>

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<sup>4</sup> The present nighttime skywave calculation methods 47CFR73.190(b) and (c) were developed by John Wang of the Commission staff after many years of analysis of skywave propagation data. The Wang propagation method is quite good for N. America north of about 30 degrees NL. The N. Magnetic pole is located at about 100 degrees WL, so the method is quite good over the northerly part of the continent (excluding Alaska and much of Canada). The present rules require that we consider all allocations in Region II in nighttime RSS calculations, with the result that stations in S. America appear in the 25% and sometimes even 50% RSS calculations of stations in Montana and New York (and elsewhere). The version of the formula in the rules does not have a provision for the double hop cases past 3200 km.

2. The Wang formula should not be used for any analysis greater than single hop, 3200 km. (Or any trans-equatorial paths, although that is moot given points that follow.)
3. The Wang formula should not be used for any case where one station is below 25 degrees NL and should be properly modified for those cases involving one station between 25 and 30 degrees NL.
4. All stations south of 15 deg. NL should not be considered in calculating the NIF of US stations.
5. Stations in Hawai'i should not be considered in calculating the NIF of mainland stations and mainland radiation toward Hawai'i should not be taken into account.
6. Objected to assignments by other countries should not be protected. Daytime overlap from foreign stations should not be considered in domestic allocation analysis. Many foreign notifications are not actual operations, or have been discontinued. This would be similar to the present policy of not considering contributions to the RSS from all foreign List B stations. Consider not protecting any List B foreign stations which cause interference to a U.S. station.
7. Non-operating assignments in other countries should not be protected past any time limitations given in the RJ-81 and bilateral agreements. Negotiations with Canada and Mexico should be undertaken to remove non-operating allocations from the international notification lists.
8. Where existing overlap exists, facilities changes should be permitted so long as domestic *interference* area (not overlap area) is not increased.
9. The ratchet rule should be deleted, as proposed by the Commission.
10. Eliminate community of license requirements (and consequently minimum coverage requirements).
11. Class A station power limit should be increased to 100 kW day and (by abrogation of the international agreements, which is what Canada did on the regional channels) 100 kW night as well.
12. The maturity of the AM band results in new station allocations which nearly always have substandard nighttime operation. Elimination of new station applications should therefore be considered.
13. The Commission's Figure M-3 conductivity map was developed by the FCC from data gathered by the National Bureau of Standards in the 1950s, from conductivity data

that had been filed in support of AM antenna proofs of performance.<sup>5</sup> The map is known to be a road-brush overview, and contains significant errors in large parts of the country. It also assumes constant values for some variable parameters such as dielectric constant. A decade later, the Central Radio Propagation Laboratory of ESSA (now a part of NTIA) began to gather data for a replacement map to overcome the shortcomings of the original one. Alfred Barghausen of CRPL described the intended methodology:<sup>6</sup>

A somewhat different method will be used in the preparation of the new map compared to the 1954 map. Briefly, this will include studies of the relationship between the effective conductivity and terrain roughness, climatology, vegetation and soil types, and thickness. To effect such a study, it will be necessary to consider the physical and chemical factors affecting conductivity of rocks and soils and geologic-geographical factors. The physical and chemical factors include (1) the porosity and infilling of water, (2) the interaction of infilling water and earth material, and (3) electrical properties of dry earth materials. Geologic-geographical factors include the study of (1) lithology, (2) geologic age, (3) structure, (4) rainfall, (5) temperature, and (6) soil. None of the above consider the mixed path propagation problem which by itself will constitute a separate study. Computer techniques will be employed to study the dependence between the many variables.

For reasons not known to us, this work was never completed. The Commission should take steps to remedy this serious deficiency to allow accurate scientifically defensible AM allocation studies, allowing minimization of interference and optimization of coverage.

## FACILITY MATTERS

1. The minimum efficiency rule and related rules should be eliminated as suggested by the Commission.
2. There should be no minimum ground system policy.
3. There should be no restriction on slant wire feeds for antenna elements up to 120 degrees, and if shown by moment method analysis of non-interference, for antenna elements above that height.

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<sup>5</sup> “Effective Radio Ground-Conductivity Measurements in the United States” National Bureau of Standards, NBS Circular 546, 1954.

<sup>6</sup> Alfred Barghausen, Leader MF Propagation Group, CRPL, letter to J.B. Hatfield (and other Consulting Engineers), 10/14/65.

4. A minimum antenna element spacing rule for DA's or a maximum RSS/RMS ratio rule should be considered.
5. Clarify that policy doesn't restrict arrays with parasitics.
6. The Commission should eliminate the annual NRSC measurement requirement, and require it only for equipment changes and prior to license renewal application.
7. In order to eliminate a large number of applications immediately after a significant group of rule changes is made, some method of staging them should be considered. For daytime groundwave situations, allowing only 50% of the possible distance from a present interference or service contour to an affected service or interference contour could be imposed for some modest period, such as two years, allowing the other, affected station to take advantage of the situation. If after two years that affected station does not file an application or is prevented from doing so by some other allocation situation, the first station could be allowed to extend the contour the remaining 50% of the allowable distance. For nighttime applications, a new cutoff procedure could be followed, in which an affected station would have some period to file a competing application. A similar process could be followed for daytime applications as well. Then provide a period of at least 90 days to allow competing applications. Base selection among competing applicants on population increase, numerical or percentage of previous population served.
8. Require that all AM stations use GPS referenced carrier generation, eliminating low frequency "warble" interference.
9. Eliminate the policy requiring current distribution measurements for top-loaded or other unusual antenna configurations when a valid moment method or other numerical analysis method is used to determine antenna characteristics.
10. Eliminate the NRSC response curve, and change the bandwidth mask for AM stations, specifying rolloff at 5 or 6 kHz to match NRSC documented receiver performance.

#### MOMENT METHOD PROOFS

1. Eliminate the requirement for "reference point" measurement in moment method proofs.
2. Eliminate the requirement for removal of base sample devices for remeasurement in periodic testing. Modify the rule to require recertification testing only within the year prior to license renewal.
3. Eliminate the restriction on use of moment method techniques when arrays use skirt

fed antenna elements.

4. Further clarify some policy matters with respect to moment method proofs of performance.

a. Clarify that software can be used as long as it does not produce errors as defined by its own diagnostic tests. (The present rule uses the term “constraints” which is subject to misinterpretation.)

b. Allow any array tower geometry to be used without a requirement for a new survey if the towers have been used in any previously licensed directional antenna pattern.

c. Add language to the rule regarding minimum capacitive reactance used in a base region model to clarify that it applies only when the total capacitance exceeds 250 pF.

#### NONTECHNICAL ADMINISTRATIVE MATTERS

1. Off-air STAs should be limited to 1 (or maybe 2) year(s) where not under licensee control. Eliminate short time operation of STAs at annual intervals used as a method of maintaining licensed status.

2. The Commission should request that Congress provide a tax benefit to licensees who voluntarily elect to request license termination. This would encourage the licensees of some substandard AM operations to discontinue them. A very large improvement in the AM service can probably not come about unless there is a large reduction in the numbers of stations, and such attrition should be encouraged.

Respectfully Submitted,

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