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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Section 2.106 of	)	ET Docket No. 93-59
the Commission's Rules to	)	RM-8092
Allocate Spectrum for	)	
Wind Profiler Radar Systems	)	

To: The Commission

COMMENTS OF
THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED

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LEAGUE, INCORPORATED

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SUMMARY

The American Radio Relay League, Incorporated, submits its comments in response to the Notice of Proposed Rule Making and Notice of Inquiry, 8 FCC Rcd. 2546 (1993). The Notice proposes to allocate the frequency 449 MHz for wind profiler radar systems, and seeks input on the possibility of allocating 915 MHz for the same purpose. Both frequency allocations would impact ongoing amateur radio operations.

The Amateur Radio Service uses the band 440-450 MHz principally for FM repeater stations, of which there are approximately 5,000 in the United States. These repeater stations are used for emergency and public service communications, including communications pursuant to a Memorandum of Understanding with the National Weather Service for severe weather spotting. If government wind profilers are to be allowed to operate at 449 MHz, this should be done only based on careful coordination processes and site selection. Non-government wind profilers would be difficult to coordinate, and would be operated in metropolitan areas where amateur repeaters are located. These circumstances dictate that only government profilers be permitted at 449 MHz.

As to the inquiry portion of the Notice, the League is without sufficient technical data to determine the interference potential to ongoing amateur operations at 902-928 MHz. The allocation status of that band generally is a "hodgepodge", and the continued addition of users detracts from the use of the band by those with current allocations. While the Amateur Radio Service might perhaps better share the band with wind profilers than with expanded Automatic Vehicle Monitoring/Location and Monitoring Service users, the combination of the two allocations might make the band unusable by anyone.

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Amendment of Section 2.106 of the Commission's Rules to Allocate Spectrum for Wind Profiler Radar Systems	)	**ET Docket No. 93-59**
	)	**RM-8092**
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To: The Commission

COMMENTS OF THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED

The American Radio Relay League, Incorporated (the League) the national association of amateur radio operators in the United States, by counsel and pursuant to §1.415(a) of the Commission's Rules [47 C.F.R. §1.415(a)], hereby respectfully submits its comments in response to the Notice of Proposed Rule Making and Notice of Inquiry, FCC 93-136, 8 FCC Rcd. 2546, released April 1, 1993 (the Notice). The Notice proposes to allocate the frequency 449 MHz for wideband wind profiler radar systems. The inquiry portion of the Notice seeks information on the possibility of allocation of 915 MHz, as per the proposal of Radian Corporation in a petition for rule making. In response to the Notice, for its comments, the League states as follows:

I. Introduction

1. The 449 MHz center frequency proposed for allocation for wind profilers is within the 420-450 MHz band. That band is allocated on a primary basis for Government Radiolocation, and on

a secondary basis to the Amateur Radio Service.[1] The Amateur Radio Service uses the band heavily, especially for FM repeater operations. The frequency splits for these repeaters are between 442.0 to 444.975 MHz, and 447.0 to 449.975 MHz.[2] This band is extremely important for amateur radio voice communications; it is the second most popular VHF/UHF amateur allocation. The newest ARRL Repeater Directory includes listings of 5,159 repeaters operating with either input or output frequencies at 447.0 to 449.975 MHz nationwide. The amateur voice repeater operations are used for public service communications, emergency communications, and for general amateur use. Amateur repeaters at 440-450 MHz are important in connection with the SKYWARN system for severe weather spotting and reporting to the National Weather Service.[3] The band is most heavily used in metropolitan areas near and around cities, but coverage to most areas of the country is provided by 440-450 MHz repeaters. Amateur voice repeater operation has proven its

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[1] See 47 C.F.R. §2.106.

[2] ARRL Repeater Directory, 1993/94 Edition; pp. 41-43.

[3] Operation SKYWARN is a plan sponsored by the National Weather Service for reporting destructive storms or other severe, unusual or abnormal weather conditions. Amateurs provide field reports, using local repeater stations for relay of the information. When requesting establishment of an Operation SKYWARN Weather Watch net, the National Weather Service office specifies the information it wishes to have reported and the times at which they wish to receive the reports. Observations include wind speed, wind direction, temperature, type of precipitation, and radial icing conditions. NWS also specifies particular areas from which the information is solicited.

value time and time again in local and regional emergency

4. In performing these obligations, amateurs use systems constructed or purchased privately. It is equipment which cannot be amortized or easily replaced. The aggregate investment in equipment for repeater stations and base, mobile and portable stations which use repeaters, purchased with post-tax dollars for public service communications purposes, is high. The value of the services provided is immeasurable. There is therefore an apparent need to include interference protection criteria for amateur stations in the 440-450 MHz band in any site selection plan for wind profilers, so that individual repeater stations are not driven off the air.

II. The 449 MHz Wind Profiler Proposal, and its Impact On the Amateur Radio Service

5. Notwithstanding the foregoing, the League is cognizant of the perceived meteorological benefits from wind profiler radars. It is understood that the current use of 404 MHz for wind profilers is untenable in the long run, and that suitable frequency bands in which they can operate are being sought elsewhere. The League has been active in CCIR Task Group 8/2 dealing with wind profiler allocations,[5] both domestically and internationally, and has

[5] Task Group 8/2 was established pursuant to Recommendation GT-PLEN/A (now known as Resolution 621) of WARC-92 (Malaga-Torremolinos, 1992), concerning Implementation of Wind Profiler Radars at frequencies near 50 MHz, 400 MHz and 1,000 MHz. That resolution specifically notes that CCIR is studying wind profiler radars at frequencies in the vicinity of those bands, and that it is "highly desirable to use wind profiler radars in frequency bands which have been agreed, preferably on a worldwide basis." The resolution further states that in the interest of effective spectrum utilization, it is necessary to include technical characteristics and sharing criteria in future studies. Thus, the CCIR was invited to continue "as a matter of urgency" its studies

contributed to the work of that Task Group. It is also apparent that there are no allocations for wind profiler radars. The World Meteorological Organization (WMO) has identified the need for three frequency bands, around 50 MHz, 400 MHz and 1,000 MHz. But the reapportionment of radio spectrum in those frequency ranges is difficult to accomplish. No existing services are eager to share allocations with wind profiler radars. Wind profiler radars are, in the definitional sense, meteorological aids, and not, strictly speaking, radiolocation devices. It is arguable that, as such, wind profilers should be operated within bands allocated to the meteorological aids service. Unfortunately, those operating experimentally at 404.37 MHz have interfered with COSPAS-SARSAT Earth-to-space links in the 406-406.1 MHz band. It is clear that such interaction should cease at the earliest possible time.

6. Given that there are no suitable meteorological aids allocations within the approximate frequencies identified by WMO, studies performed by NTIA focused on bands allocated to the radiolocation service, as the technical characteristics of wind profiler radars are similar to those of other radars. This theoretically provided compatibility, but it appeared that wind profiler radars might interfere with existing radiolocation radars.

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on the characteristics and requirements of wind profiler radars, and to make recommendations "at the next competent WARC" as to the technically suitable frequency bands, associated standards and frequency sharing criteria necessary for compatibility with the services that may be affected. It also noted the undesirable nature of continued operation of profilers in the vicinity of 400 MHz due to interference to the COSPAS-SARSAT system.

NTIA studied the 420-450 MHz band, which, as mentioned above, is allocated to the radiolocation service on a primary basis and the amateur service on a secondary basis. It decided to recommend, with the concurrence of the Interdepartment Radio Advisory Committee (IRAC), allocation of the frequency 449 MHz. The basis for doing so was that it was at the upper band edge and would subject Government radiolocation radars operating in the band to the least interference.

7. From the viewpoint of the Amateur Radio Service, 449 MHz is clearly not a good choice. Assuming a 2 MHz bandwidth for wind profilers at that frequency, the allocation falls on a portion of the 420-450 MHz band used extensively for FM repeater inputs or outputs (depending on local preference). There is, however, no two-MHz wide segment within that band within which wind profiler radars will not cause interference to some type of amateur operation, somewhere in the U.S. or Canada. A joint Canadian Radio Relay League[6] and Canadian Department of Communications study concluded that a center frequency of 441 MHz would have been less disruptive to the Amateur Radio Service, particularly with respect to repeaters, which in the United States and Canada use the segments 442-445 MHz and 447-450 MHz for inputs and outputs.

8. The League would have preferred that the Commission establish several alternative frequencies for wind profiler radars,

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[6] The Canadian Radio Relay League has recently been superseded by a new, larger Amateur Radio Society, Radio Amateurs of Canada (RAC).

rather than just one, so that, at a particular profiler site, the frequency with the least impact on existing amateur operations could be chosen. Assuming that it is necessary, for economic reasons or otherwise, to choose a single frequency, the League would have suggested a more thorough study of alternative frequencies within the 440-450 MHz band. For example, 446 MHz might have been a better choice from the point of view of interference avoidance to amateur uses, as the segment 445-447 MHz is in the "gap" between repeater input and output frequencies. This segment would present its own interference problems, as it is used for simplex (non-repeater) operation and for auxiliary and telecommand links. Thus, any study would have to determine the impact of wind profiler radars on these operations.[7]

9. Unfortunately, the IRAC frequency allocation process is not open to private sector input. Minutes of IRAC's deliberations are no longer available to the public. Nevertheless, the League was able to provide information concerning amateur system

center frequency will result in interference to amateur repeaters in certain locations. On the other hand, it appears possible, by careful site selection, to choose sites for 449 MHz wind profiler radars that will not result in interference to amateur repeaters. Based on field measurements and calculations, at distance separations less than 50 km, use of interference mitigation techniques are needed to avoid mutual interference. The League has received assurances from NTIA that site selection will take amateur repeaters into account and that profilers will be installed so as to avoid interaction with amateur repeater stations. A procedure for site selection and coordination between NTIA, NOAA and the League is being developed. With continued cooperation and willingness to resolve instances of interference to amateur repeater stations, Government wind profiler radar operation at 449 MHz appears feasible. Without such cooperation which must be mandated in the Commission Rules, wind profiler radars at 449 MHz will inevitably cause interference to existing amateur FM repeaters and the allocation would be unwise.

10. Although IRAC, through its non-public spectrum allocation procedures, has allocated 449 MHz on a primary basis to Government wind profiler radars, this does not necessitate that the Commission, through its public process, must allocate 449 MHz for non-Government wind profiler radars on a primary basis. Given the cost of establishing a wind profiler transmitter and antenna system, it would not appear that many 449 MHz wind profiler radars will be sought by non-Government entities. It might be, however,

that a few universities offering meteorological studies curricula may have an interest in wind profilers, and that such might be located in metropolitan areas. While the League has been told, and believes, that Government 449 MHz wind profiler radars will normally be situated away from metropolitan areas, this would not be true of universities or other non-Government licensees. There is no demonstrated need in this proceeding, or otherwise to the League's knowledge, to permit **non**-Government wind profilers at 449 MHz, and the League strongly recommends that they not be permitted.[8]

11. If, notwithstanding this recommendation, the Commission decides to permit **non**-government profilers at 449 MHz, they should be prohibited in metropolitan or suburban areas.[9] In such environments, interference to the Amateur Radio Service, and disruption of public service and emergency communications, is a virtual certainty. In addition, an allocation at 449 MHz for non-Government wind profiler radars should be secondary to the Amateur

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[8] As discussed hereinbelow, the League is confident that a cooperative informal coordination process will minimize interaction between government profilers and the Amateur Radio Service. This is premised in part on the discussions with NTIA and NOAA to date, and because of the preexisting Memorandum of Understanding and ongoing

Radio Service outside SMSAs, and operation should be subject to prior site-selection coordination, including advance notification, with the Amateur Radio Service. This could be accomplished using the same procedure now being developed between NTIA, NOAA and the League.

12. The Commission is undoubtedly aware that the technical characteristics of 449 MHz wind profiler radars are not completely known or specified. Although the technical standards committee work performed by IRAC is not open to public scrutiny, it is the League's understanding that standards therefor have just in the last few days been developed.[10] If so, it appears premature for the Commission to make any allocation decision in this proceeding which would result in amendment of Part 2 of the Rules. It is unfair to the public to be asked to comment without having the manifest technical standards incorporated in the Notice by reference, or at least available for public review, first. One primary concern that is currently not subject to meaningful comment is, for example, that the actual bandwidth of the devices is not specified. Bandwidth of a profiler can change according to operating mode and could exceed 2 MHz if the so-called "super low mode" is used. If the bandwidth were increased to, as an example,

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[10] It is the League's understanding, however, that IRAC has recently approved and submitted to NTIA some criteria for wind profilers, which are subject to incorporation in the manual of Regulations and Procedures for Federal Radio Frequency Management. These standards have not been released to the public, and should have been before the public is asked by the Commission to comment on the allocation proposal. The cart is, in this instance, very much before the horse.

3 MHz, part of the signal would extend out of the band, above 450 MHz,[11] and below 448 MHz. Publication of available technical data should be made before any decision is reached in this proceeding, and if necessary, a second round of comments should be permitted after publication of currently available data.

13. Ultimately, with respect to government profilers at 449 MHz, assuming that the technical standards for such, when published, do not reveal significant changes from the assumed operating characteristics of profilers now operating at 404 MHz, there appears a reasonable basis for shared operation at 449 MHz between amateurs and wind profiler radars. Should the Commission proceed with the allocation, the proposed method of coordination with the Amateur Radio Service to prevent interference to repeater operation should be modified somewhat from that discussed at Paragraph 12 of the Notice.

14. First of all, proposed Footnote US329 should be amended to eliminate reference to the ARRL Repeater Directory, which is not designed as a complete database for coordination use. It is, rather, a guide for traveling amateurs, listing primarily the repeaters in a geographical area which would welcome visiting radio amateurs. It includes none of the many auxiliary links in the band (in part, because the licensees which operate those links prefer that they not be published), and none of the other amateur uses therein. Part of the procedure being developed between the Ingress

NOAA and NTIA is to provide a more appropriate database. The League recommends that the words "latest ARRL Repeater Directory" be replaced by "ARRL Repeater Data Base."

15. The advance notification requirement should be modified so that amateurs are notified as soon as a site is under consideration, so that any objection based on interference concerns can be adjudicated in advance of any extensive site acquisition arrangements, and before any construction plans are fixed for the planned profiler. The minimum advance notification should be 180 days, rather than the proposed 120 days in the Notice proposal, to allow for the fact that access to some repeater sites is weather-restricted during much of the year.

16. Finally, the wind profiler operator should be under an affirmative obligation to minimize interference to pre-existing amateur operations to the extent possible, including adjustment of antenna orientation, installation of berms and other screening, and selection of an alternate site if such is available. With those modifications, a cooperative sharing environment appears possible under the circumstances.

III. Wind Profilers at 915 MHz

17. The Notice of Inquiry portion of the Notice solicits input regarding all aspects of the need for, and implications of, an allocation of spectrum within the 902-928 MHz band for wind profilers. This is a broad topic, given the vast array of uses

made of the 902-928 MHz band, but with respect to the Amateur Radio Service, some general observations can be made.[12]

18. It is recognized that a frequency around 1000 MHz has been deemed useful for wind profiler radars as a supplement or alternative to those operating around 400 MHz. Radiolocation allocations exist in the Region 2 frequency table in the following bands: 890-942 MHz, 1215-1240 MHz, 1240-1300 MHz and 1350-1400 MHz. The 1350-1400 MHz band delineates the acknowledged upper limit of wind profiler radars. The 902-928 MHz band, with a center frequency of 915 MHz, appears a possible candidate because 915 MHz is the center frequency for industrial, scientific and medical (ISM) applications. Considering only that relationship, wind profiler radars should be able to coexist with ISM installations, as the former are assumed to be located in rural areas and the latter in

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[12] The League filed comments in response to Radian's petition (RM-8092) for a 915 MHz channel for wind profilers. As acknowledged in the Notice, Radian initially asked for a 2 MHz-wide channel, but in reply comments modified the proposal to specify a 12.5 MHz-wide channel. The League's comments on the Radian petition noted the inconsistency in the technical claims made by Radian, and the prematurity of the proposed allocation due to the pendency of the CCIR study of appropriate allocations for wind profilers. It noted as well that technical and operational characteristics of profilers at that frequency have not been developed. The IRAC standards definition group referred to hereinabove has just developed yet-unpublished technical operating standards for wind profilers at 449 MHz. There is, however, no apparent comparable work completed or underway with respect to any technical or operating parameters for wind profilers in the vicinity of 1,000 MHz. Experimental licenses are currently outstanding for such devices at 902-928 MHz, but the results of those have not given rise to generally accepted technical or operational rules. The petition was premature at the time it was filed, and that situation still exists.

industrial areas. Beyond that relationship, however, the problem is not that simple.

19. The 902-928 MHz band is already an uncomfortable melting pot of uses. Allocating a 12.5 MHz-wide channel centered on 915 MHz for wind profiler radars, while at the same time allocating the entire band for the Location and Monitoring Service (LMS), as proposed in PR Docket 93-61,[13] will add to the existing list of dissimilar uses in the band. These include ISM, government radiolocation, fixed and mobile, Automatic Vehicle Monitoring, amateur, and Part 15 devices. The allocation status of this band was not the result of any apparent plan or design. It was, rather, the result of incremental allocation decisions, each one addressed to a particular effort to accommodate individual uses. Each additional incremental addition to the 902-928 MHz allocation, now including wind profiler radars and LMS, brings the band closer to "gridlock" status. For this reason, the Commission should not act on wind profiler radars at 915 MHz without taking into account the

taken together, detract significantly from the utility of the band for the Amateur Radio Service.

20. The League is very much concerned about continued effective use of the 902-928 MHz band for the Amateur Service. The existence of AVM in certain metropolitan areas, for example, has been a limiting factor in development of amateur operations in those areas. Whether wind profiler radars would impose another

known. The type of antenna determines sidelobe attenuation, which would directly affect the required distance separation relative to other terrestrial systems.

B. Since a wind profiler radar operating at 915 MHz would be capable of providing wind shear data, there is a possibility that some wind profiler radars may be proposed for location at or near airports.

C. It is likely that universities having meteorological programs will consider a 915 MHz wind profiler radar because it costs less than one operating at 449 MHz. If these wind profiler radars are to be located at universities, usually in urban areas, they could be

League requests that the Commission consider issuance of a Further Notice to provide such information.

24. Above all, in considering the allocation of 449 MHz for government wind profilers, the League would stress the need for prior, affirmative coordination efforts on the part of the profiler operator. The proposed sharing arrangement might work if the National Weather Service, NOAA and NTIA continue to work with the League, in accordance with the accommodation requirements proposed in the Notice and as additionally suggested in these Comments. If the coordination requirements are not sufficiently detailed, and if the obligation of the profiler operator is insufficiently established in any rules adopted in this proceeding, the Amateur Radio Service will inevitably be the victim of disruptive interference. It is unnecessary at the present time to permit the establishment of non-government wind profilers at 449 MHz. That should be done, if at all, in a separate proceeding, once government wind profilers and the Amateur Radio Service have had an opportunity to establish workable coordination plans. Finally, there is no present justification for any proposal to permit 915 MHz wind profilers. At such time as generally accepted standards for such are established, the matter might be revisited, as should the overall issue of additional allocations in the 902-928 MHz band.

Therefore, the foregoing considered, the American Radio Relay League, Incorporated, respectfully requests that any rules adopted in this proceeding to accommodate government wind profilers at 449

MHz take into account the modifications proposed in these comments; and that such additional rules as the Commission deems necessary to protect amateur radio repeater and other facilities from harmful interference from 449 MHz wind profilers, be enacted.

Respectfully submitted,

THE AMERICAN RADIO RELAY
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