

Note: Pursuant to Public Law 104-134, the first inflation adjustment cannot exceed 10 percent of the statutory maximum amount.

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BILLING CODE 6712-01-P

47 CFR Parts 74, 78, and 101

[ET Docket No. 96-35; FCC 97-1]

Flexible Standards for Directional Microwave Antennas

ACTION: Final rule.

SUMMARY: This action amends the performance standards for directional microwave antennas of the Commission's Rules in order to permit the use of new antenna technology. Specifically, the rule amendments will allow licensees to show compliance with the Commission's Rules for antenna standards using either minimum antenna gain or maximum radiation beamwidth. This action removes an implicit prohibition in the Commission's Rules against new types of antennas which have narrow beamwidths, but insufficient gains. This action also will encourage innovation in antenna technology and will give licensees more options in the types of antennas they may employ, without decreasing spectrum efficiency or increasing interference.

EFFECTIVE DATE: March 5, 1997.

FOR FURTHER INFORMATION CONTACT: Michael J. Marcus, 418-2470 or Tom Mooring, 418-2450, Office of Engineering and Technology.

SUPPLEMENTARY INFORMATION: This is a summary of the Commission's *Report and Order*, ET Docket 96-35, FCC 97-1, adopted January 2, 1997, and released January 17, 1997. The full text of this Commission decision is available for inspection and copying during normal business hours in the FCC Reference Center (Room 239), 1919 M Street, N.W., Washington, D.C., and also may be purchased from the Commission's duplication contractor, International Transcription Service, (202) 857-3800, 2100 M Street, N.W., Suite 140, Washington, D.C. 20037.

Summary of the Report and Order

1. By this action, the Commission amends its fixed service microwave rules to make them more compatible with certain emerging technologies for directional antennas. Specifically, we will permit alternative showings that antennas comply with maximum beamwidth requirements rather than requirements for minimum antenna gains. The Commission believes that

this action will preserve the intent of the rules to maximize spectrum efficiency and minimize interference. At the same time, such changes will provide Commission licensees with additional flexibility to use directional antennas employing emerging technologies for which, in contrast to conventional antennas, maximum antenna beamwidth is not correlated directly with minimum antenna gain. Finally, the Commission believes that these amendments promote the national policy goals set forth in Section 257 of the Communications Act by enabling entrepreneurs and other small businesses to market new and innovative antenna technology to providers of telecommunications services and information services.

2. On February 29, 1996, we adopted a *Notice of Proposed Rule Making* ("NPRM") in this proceeding, 61 FR 11798, March 22, 1996. In the NPRM, we proposed to permit licensees to make a showing that the antennas employed under Parts 74, 78, and 101 meet minimum antenna performance standards through the use of maximum beamwidth requirements as an alternative to minimum antenna gain requirements. In addition, we proposed to treat all antennas as if they had the mainlobe shape and gain of a conventional parabolic dish antenna.

3. The parties generally support the basic proposal in the NPRM, that is, to allow users to show compliance with the minimum antenna performance standards using either maximum beamwidth or minimum gain. For example, Comsearch states that spectrum efficiency depends upon antenna radiation pattern performance (beamwidth, sidelobe suppression, and front-to-back ratio), not upon antenna gain, and that thus, there is no need for a minimum antenna gain requirement as long as the maximum beamwidth and minimum radiation suppression requirements are met. Endgate Corporation ("Endgate") agrees that the adoption of this proposal would remove a regulatory impediment to the use of new antenna technology and further states that such action would provide manufacturers with the flexibility to develop antennas with specific performance properties that are appropriate for the application, rather than performance limited by pre-existing regulations.

4. We agree with Comsearch that spectrum efficiency is dependent upon antenna radiation pattern performance, that is, the beamwidth, sidelobe suppression, and the front-to-back ratio, and not upon antenna gain per se. Thus, we find that a showing of maximum

beamwidth as an alternative to a minimum antenna gain showing can be permitted with no impact on spectrum efficiency. Moreover, we believe that such a change serves the public interest because it allows a greater choice of technologies for licensees. Accordingly, we amend Sections 74.536, 74.641, 78.105, and 101.115 of the Commission's Rules to permit licensees to demonstrate compliance using either minimum gain or maximum beamwidth. The table below summarizes these amendments:

Minimum gain	Maximum beamwidth (degrees)	Rule section	Band (GHz)
34 dBi ...	3.5	101.115 (c)	10.55-10.68
36 dBi ...	2.7	101.115 (c)	3.7-4.2
38 dBi ...	2.2	101.115 (c)	5.925-6.425
.....	6.525-6.875
.....	10.55-10.68
.....	10.63-10.68
.....	10.7-11.7
.....	17.70-18.82
.....	74.536(c)	17.7-19.7
.....	74.641(a)(1)	17.7-19.7
.....	78.105(a)(1)	17.7-19.7
.....	101.115 (c)	18.92-19.70
.....	21.2-23.6
.....	Above 31.3
.....	78.105(a)(1)	38.6-40.0

5. In the NPRM, we observed that even with the sidelobe suppression required by the existing rules, new types of antennas, such as planar array antennas, may differ somewhat from conventional dish and horn antennas in the exact shape of the mainlobe. We stated that we do not believe that these differences in the shape of the mainlobe would have a significant impact on spectrum efficiency and, therefore, we proposed to treat all antennas as if they had the mainlobe shape and total gain of a conventional parabolic dish antenna.

6. We agree with Alcatel Network Systems, Inc. ("Alcatel"), Comsearch, and National Spectrum Managers Association ("NSMA") that the present requirement that fixed microwave applicants under Part 101 provide antenna measurement data for coordination should be retained without modification because the use of actual

patterns will maximize spectrum efficiency. Therefore, we are not amending the rules in this respect. We also agree with Andrew Corporation ("Andrew") that compliance with the maximum beamwidth requirements should be met in both the azimuth and elevation planes. Accordingly, we are amending the antenna standards tables in Parts 74, 78, and 101 by adding a footnote, which states that if a licensee chooses to show compliance using maximum beamwidth to 3 dB points, the beamwidth limit shall apply in both the azimuth and the elevation planes. However, we decline to change the radiation suppression limitations because these issues are outside the scope of this proceeding.

7. The Society of Broadcast Engineers ("SBE") requests that the Commission apply the proposed flexible minimum antenna standards to receiving antennas as well as transmitting antennas. SBE states that a receiving antenna with an unnecessarily broad radiation pattern envelope can have just as great a preclusive effect on spectrum efficiency as a transmitting antenna with an overly broad pattern.

8. We observe that under the aural broadcasting auxiliary station and fixed microwave service rules, the new flexible minimum antenna standards apply to both transmitting and receiving antennas.¹ However, under the television broadcast auxiliary station and cable television relay service rules, the choice of receiving antennas is left to the discretion of the licensee. Further, the licensee is not protected from interference that results from the use of antennas with poorer performance than identified in the pertinent antenna standards table.²

Final Regulatory Flexibility Analysis

9. As required by Section 603 of the Regulatory Flexibility Act, 5 U.S.C. 603 ("RFA"), an Initial Regulatory Flexibility Analysis ("IRFA") was incorporated into the NPRM in this proceeding. The Commission sought written public comments on the proposals in the NPRM, including the IRFA. The Commission's Final Regulatory Flexibility Analysis ("FRFA") in this Report and Order conforms to the RFA, as amended by the Contract With America Advancement Act of 1996 ("CWA"), Public Law 104-121, 110 Stat. 847 (1996).³

10. *Need for and Objectives of the Rules.* The rule amendments are needed

in order to allow licensees to make an alternative showing of compliance with the Commission's Rules for antenna standards. The objective of the rule amendments is to permit the use of new antenna technologies.

11. *Summary of Significant Issues Raised by the Public Comments in Response to the IRFA.* No comments were submitted in direct response to the IRFA. Nonetheless, we have considered the significant economic impact of the proposals on small entities.

12. *Description and Estimate of the Number of Small Entities to Which Rule Will Apply.* The RFA generally defines the term "small business" as having the same meaning as the term "small business concern" under the Small Business Act, 15 U.S.C. 632. Based on the statutory provision, we will consider a small business concern one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration ("SBA"). The RFA SBREFA provisions also apply to nonprofit organizations and to governmental organizations.

13. These rule amendments pertain to licensees providing point-to-point microwave services. The Commission has not developed a definition of small entities applicable to these services. Therefore, we will utilize the SBA definition applicable to radiotelephone companies. This definition provides that a small entity is a radiotelephone company employing fewer than 1,500 persons.⁴ Census Bureau data indicates that there are 1,164 radiotelephone companies with fewer than 1,500 employees, that might qualify as small entities if they are independently owned and operated.⁵ Since the Regulatory Flexibility Act amendments were not in effect until the record in this proceeding was closed, the Commission was unable to request information regarding the number of small businesses that would be affected by this action. It is unknown how many small entities may be affected. We believe that all entities affected by the rule amendments will benefit from this action which allows licensees more flexibility in making a showing that their antennas meet minimum antenna performance standards.

14. *Description of Projected Reporting, Recordkeeping and Other Compliance Requirements.* No new

requirements are involved. Licensees will be afforded the option of complying with a standard for maximum antenna beamwidth as an alternative to complying with the existing requirement for minimum antenna gain. Thus, the types of professional skills necessary to comply with the rule amendments already exist within the effected companies.

15. *Significant Alternatives and Steps Taken by Agency to Minimize Significant Economic Impact on a Substantial Number of Small Entities Consistent with Stated Objectives.* We have considered and rejected several significant alternatives. The NPRM raised the question of whether new types of antennas should be presumed to be conventional for coordination purposes. All the commenting parties opposed such a change and stated that the present requirement that licensees provide antenna measurement data for coordination should be retained. We agree and are keeping all such existing requirements without modification. In comments Endgate Corporation proposes that the Commission adopt a maximum radiated power envelope in place of the existing rules which specify both the maximum transmitter power and the relative sidelobe radiation suppression values. This would allow wide antenna beams and higher sidelobe levels for licensees that use less than the maximum radiated power. Both Comsearch and NSMA oppose Endgate's proposal in reply comments. Comsearch points out that since most terrestrial microwave systems are licensed below the maximum EIRP limits, this proposal would increase the amount of allowed radiated power at angles off the main beam which increases interference potential and constrains frequency reuse for terrestrial systems. NSMA raised similar concerns. Thus we decline to make this change as suggested by Endgate as we find that the risk of decreased spectrum efficiency outweighs the benefits for microwave licensees, including small entities.

16. Andrew interprets the existing and proposed rules on beamwidth to limit only horizontal beamwidth and asks that the rules clearly state that both horizontal and vertical beamwidth and radiation suppression be limited. We agree that for antennas to show compliance with requirements by meeting a maximum beamwidth that beamwidth must apply in both planes. However, we decline to apply this requirement to antennas that show compliance with the existing minimum gain requirement. If a high gain requirement is met by the antenna, physical principals limit the amount of

¹ See 47 CFR 74.536(b), 101.115(c) (1995).

² See 47 CFR 74.641(a)(3), 78.105(a)(3) (1995).

³ Subtitle II of the CWA is "The Small Business Regulatory Enforcement Fairness Act of 1996" ("SBREFA"), codified at 5 U.S.C. 601 *et seq.*

⁴ 13 CFR 121.201, Standard Industrial Classification (SIC) Code 4812.

⁵ U.S. Dept. of Commerce, 1992 Census of Transportation, Communications and Utilities: Establishment and Firm Size 10123 (May 1995).

trade off between vertical and horizontal beamwidth that is possible. Also, we clearly stated in the NPRM that we did not intend to modify requirements for existing antennas which met our minimum gain requirement.

17. SBE requests that the Commission apply the proposed flexible minimum antenna standards to receiving antennas as well as to transmitting antennas. Since the NPRM addressed explicitly the alternative minimum gain requirement only, we will not consider SBE's request in this proceeding. SBE also requests that the Commission issue an updated list of "frequency congested areas" in which Category A antennas would be required. However, SBE submitted no data indicating which areas should be so designated. Since we have no record to base a decision on, we decline to act at this time.

18. Alcatel proposes that antenna standards for the 10 GHz band be relaxed to allow continued use of 2 foot antennas after 1997 as opposed to the 4 foot antennas required by present rules. Alcatel was supported in reply comments by TIA. Similarly, INNOVA proposes that requirements for 37-40 GHz antennas be relaxed. These two proposals were outside the scope of the original notice and we feel that there is insufficient record to adopt them at this time.

19. *Report to Congress:* The Commission shall send a copy of this

Final Regulatory Flexibility Analysis, along with this Report and Order, in a report to Congress pursuant to the Small Business Regulatory Enforcement Fairness Act of 1996, 5 U.S.C. 801 (a)(1)(A).

List of Subjects

47 CFR Part 74

Radio, Television.

47 CFR Part 78

Cable television, Communications equipment, Radio.

47 CFR Part 101

Communications common carriers, Communications equipment, Radio.

Federal Communications Commission.
William F. Caton,
Acting Secretary.

Rule Changes

Parts 74, 78, and 101 of the Code of Federal Regulations are amended as follows:

PART 74—EXPERIMENTAL RADIO, AUXILIARY, SPECIAL BROADCAST AND OTHER PROGRAM DISTRIBUTIONAL SERVICES

1. The authority citation for Part 74 continues to read as follows:

Authority: Secs. 4, 303, 48 Stat. 1066, as amended, 1082, as amended; 47 U.S.C. 154, 303, 554.

2. In Section 74.536, paragraphs (b) and (c) are revised to read as follows:

§ 74.536 Directional antenna required.

* * * * *

(b) An aural broadcast STL or intercity relay station operating in the 17.7-19.7 GHz band shall employ an antenna that meets the performance standards for Category A, except that in areas not subject to frequency congestion, antennas meeting standards for Category B may be employed. However, the Commission may require the replacement, at the licensee's expense, of any antenna or periscope antenna system of a permanent fixed station that does not meet performance Standard A, which is specified in the table in paragraph (c) of this section, upon a showing that said antenna causes or is likely to cause interference to (or receive interference from) any other authorized or proposed station; provided that an antenna meeting performance Standard A is unlikely to involve such interference.

(c) Licensees shall comply with the antenna standards table shown in this paragraph in the following manner:

(1) With either the maximum beamwidth to 3 dB points requirement or with the minimum antenna gain requirement; and

(2) With the minimum radiation suppression to angle requirement.

ANTENNA STANDARDS

Frequency (GHz)	Category	Maximum beamwidth to 3 dB points ¹ (included angle in degrees)	Minimum antenna gain (dbi)	Minimum radiation suppression to angle in degrees from center-line of main beam in decibels						
				5° to 10°	10° to 15°	15° to 20°	20° to 30°	30° to 100°	100° to 140°	140° to 180°
17.7 to 19.7	A	2.2	38	25	29	33	36	42	55	55
	B	2.2	38	20	24	28	32	35	36	36
31.0 to 31.3 ²	n/a	³ 4.0	38	n/a	n/a	n/a	n/a	n/a	n/a	n/a

¹ If a licensee chooses to show compliance using maximum beamwidth to 3 dB points, the beamwidth limit shall apply in both the azimuth and the elevation planes.

² Mobile, except aeronautical mobile, stations need not comply with these standards.

³ The minimum front-to-back ratio shall be 38 dBi.

3. In Section 74.641, paragraph (a)(1) is revised to read as follows:

§ 74.641 Antenna systems.

(a) * * *

(1) Fixed TV broadcast auxiliary stations shall use directional antennas that meet the performance standards indicated in the following table. Upon adequate showing of need to serve a larger sector, or more than a single sector, greater beamwidth or multiple antennas may be authorized. Applicants shall request, and authorization for stations in this service will specify, the polarization of each transmitted signal. Booster station antennas having narrower beamwidths and reduced sidelobe radiation may be required in congested areas, or to resolve interference problems.

(i) Stations must employ an antenna that meets the performance standards for Category B. In areas subject to frequency congestion, where proposed facilities would be precluded by continued use of a Category B antenna, a Category A antenna must be employed. The Commission may require the use of a high performance antenna where interference problems can be resolved by the use of such antennas.

(ii) Licensees shall comply with the antenna standards table shown in this paragraph in the following manner:

(A) With either the maximum beamwidth to 3 dB points requirement or with the minimum antenna gain requirement; and

(B) With the minimum radiation suppression to angle requirement.

ANTENNA STANDARDS

Frequency (MHz)	Category	Maximum beamwidth to 3 dB points ¹ (included angle in degrees)	Minimum antenna gain (dbi)	Minimum radiation suppression to angle in degrees from center-line of main beam in decibels						
				5° to 10°	10° to 15°	15° to 20°	20° to 30°	30° to 100°	100° to 140°	140° to 180°
1,990 to 2,110	A	5.0	n/a	12	18	22	25	29	33	39
	B	8.0	n/a	5	18	20	20	25	28	36
6,875 to 7,125	A	1.5	n/a	26	29	32	34	38	41	49
	B	2.0	n/a	21	25	29	32	35	39	45
12,700 to 13,250	A	1.0	n/a	23	28	35	39	41	42	50
	B	2.0	n/a	20	25	28	30	32	37	47
17,700 to 19,700	A	2.2	38	25	29	33	36	42	55	55
	B	2.2	38	20	24	28	32	35	36	36
31,000 to 31,300 ²	n/a	³ 4.0	38	n/a	n/a	n/a	n/a	n/a	n/a	n/a

¹ If a licensee chooses to show compliance using maximum beamwidth to 3 dB points, the beamwidth limit shall apply in both the azimuth and the elevation planes.

² Mobile, except aeronautical mobile, stations need not comply with these standards.

³ The minimum front-to-back ratio shall be 38 dBi.

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PART 78—CABLE TELEVISION RELAY SERVICE

1. The authority citation for Part 78 continues to read as follows:

Authority: Secs. 2, 3, 4, 301, 303, 307, 308, 309, 48 Stat., as amended, 1064, 1065, 1066, 1081, 1082, 1083, 1084, 1085; 47 U.S.C. 152, 153, 154, 301, 303, 307, 308, 309.

2. In Section 78.105, paragraph (a)(1) is revised to read as follows:

§ 78.105 Antenna systems.

(a) * * *

(1) Fixed CARS stations shall use directional antennas that meet the performance standards indicated in the following table.

(i) Stations must employ an antenna that meets the performance standards for Category B. In areas subject to frequency congestion, where proposed facilities would be precluded by continued use of a Category B antenna, a Category A antenna must be employed. The Commission may require the use of a high performance antenna where interference problems can be resolved by the use of such antennas.

(ii) Upon adequate showing of need to serve a larger sector, or more than a single sector, greater beamwidth or multiple antennas may be authorized. Applicants shall request and authorization for stations in this service will specify the polarization of each transmitted signal.

(iii) Licensees shall comply with the antenna standards table shown in this paragraph in the following manner:

(A) With either the maximum beamwidth to 3 dB points requirement

or with the minimum antenna gain requirement; and

(B) With the minimum radiation suppression to angle requirement.

ANTENNA STANDARDS

Frequency (MHz)	Category	Maximum beamwidth to 3 dB points ¹ (included angle in degrees)	Minimum antenna gain (dbi)	Minimum radiation suppression to angle in degrees from center-line of main beam in decibels						
				5° to 10°	10° to 15°	15° to 20°	20° to 30°	30° to 100°	100° to 140°	140° to 180°
12,700 to 13,250	A	1.0	n/a	23	28	35	39	41	42	50
	B	2.0	n/a	20	25	28	30	32	37	47
17,700 to 19,700	A	2.2	38	25	29	33	36	42	55	55
	B	2.2	38	20	24	28	32	35	36	36
31,000 to 31,300 ²	n/a	³ 4.0	38	n/a	n/a	n/a	n/a	n/a	n/a	n/a

ANTENNA STANDARDS—Continued

Frequency (MHz)	Category	Maximum beamwidth to 3 dB points ¹ (included angle in degrees)	Minimum antenna gain (dbi)	Minimum radiation suppression to angle in degrees from center-line of main beam in decibels						
				5° to 10°	10° to 15°	15° to 20°	20° to 30°	30° to 100°	100° to 140°	140° to 180°
38,600 to 40,000	A	2.2	38	25	29	33	36	42	55	55
	B	2.2	38	20	24	28	32	35	36	36

¹ If a licensee chooses to show compliance using maximum beamwidth to 3 dB points, the beamwidth limit shall apply in both the azimuth and the elevation planes.

² Mobile, except aeronautical, mobile, stations need not comply with these standards.

³ The minimum front-to-back ratio shall be 38 dBi.

PART 101—FIXED MICROWAVE SERVICES

1. The authority citation for Part 101 continues to read as follows:

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

2. In Section 101.115, paragraph (c) is revised to read as follows:

§ 101.115 Directional antennas.

* * * * *

(c) Fixed stations (other than temporary fixed stations and DEMS nodal stations) operating at 932.5 MHz or higher must employ transmitting and receiving antennas (excluding second receiving antennas for operations such as space diversity) meeting the appropriate performance Standard A indicated below, except that in areas not subject to frequency congestion, antennas meeting performance Standard B may be used, subject to the

requirements set forth in paragraph (d) of this section. Licensees shall comply with the antenna standards table shown in this paragraph in the following manner:

(1) With either the maximum beamwidth to 3 dB points requirement or with the minimum antenna gain requirement; and

(2) With the minimum radiation suppression to angle requirement.

ANTENNA STANDARDS

Frequency (MHz)	Category	Maximum beamwidth to 3 dB points ¹ (included angle in degrees)	Minimum antenna gain (dbi)	Minimum radiation suppression to angle in degrees from center-line of main beam in decibels						
				5° to 10°	10° to 15°	15° to 20°	20° to 30°	30° to 100°	100° to 140°	140° to 180°
932.5 to 935	A	14.0	n/a	n/a	6	11	14	17	20	24
	B	20.0	n/a	n/a	n/a	6	10	13	15	20
941.5 to 944	A	14.0	n/a	n/a	6	11	14	17	20	24
	B	20.0	n/a	n/a	n/a	6	10	13	15	20
952 to 960 ^{2,3}	A	14.0	n/a	n/a	6	11	14	17	20	24
	B	20.0	n/a	n/a	n/a	6	10	13	15	20
1,850 to 2,500 ⁴	A	5.0	n/a	12	18	22	25	29	33	39
	B	8.0	n/a	5	18	20	20	25	28	36
3,700 to 4,200	A	2.7	36	23	29	33	36	42	55	55
	B	2.7	36	20	24	28	32	32	32	32
5,925 to 6,425 ⁵	A	2.2	38	25	29	33	36	42	55	55
	B	2.2	38	21	25	29	32	35	39	45
5,925 to 6,425 ⁶	A	2.2	38	25	29	33	36	42	55	55
	B	2.2	38	20	24	28	32	35	36	36
6,525 to 6,875 ⁵	A	2.2	38	25	29	33	36	42	55	55
	B	2.2	38	21	25	29	32	35	39	45
6,525 to 6,875 ⁶	A	1.5	n/a	26	29	32	34	38	41	49
	B	2.0	n/a	21	25	29	32	35	39	45
10,550 to 10,680 ^{5,7}	A	2.2	38	25	29	33	36	42	55	55
	B	2.2	38	20	24	28	32	35	35	39
10,550 to 10,680 ⁶	A	3.4	34	20	24	28	32	35	55	55
	B	3.4	34	20	24	28	32	35	35	39
10,565 to 10,615	n/a	360	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
10,630 to 10,680 ⁸	n/a	3.5	34	20	24	28	32	35	36	36
10,700 to 11,700 ⁵	A	2.2	38	25	29	33	36	42	55	55
	B	2.2	38	20	24	28	32	35	36	36
12,200 to 13,250 ⁹	A	1.0	n/a	23	28	35	39	41	42	50
	B	2.0	n/a	20	25	28	30	32	37	47
17,700 to 18,820	A	2.2	38	25	29	33	36	42	55	55
	B	2.2	38	20	24	28	32	35	36	36
18,920 to 19,700 ¹⁰	A	2.2	38	25	29	33	36	42	55	55
	B	2.2	38	20	24	28	32	35	36	36
21,200 to 23,600 ¹¹	A	2.2	38	25	29	33	36	42	55	55
	B	2.2	38	20	24	28	32	35	36	36
31,000 to 31,300 ^{12,13}	n/a	4.0	38	n/a	n/a	n/a	n/a	n/a	n/a	n/a

ANTENNA STANDARDS—Continued

Frequency (MHz)	Category	Maximum beamwidth to 3 dB points ¹ (included angle in degrees)	Minimum antenna gain (dbi)	Minimum radiation suppression to angle in degrees from centerline of main beam in decibels						
				5° to 10°	10° to 15°	15° to 20°	20° to 30°	30° to 100°	100° to 140°	140° to 180°
Above 31,300	A	2.2	38	25	29	33	36	42	55	55
	B	2.2	38	20	24	28	32	35	36	36

¹ If a licensee chooses to show compliance using maximum beamwidth to 3 dB points, the beamwidth limit shall apply in both the azimuth and the elevation planes.

² Except for Multiple Address System frequencies listed in §§ 101.147(b)(1) through (b)(4), where omnidirectional antennas may be used.

³ Antennas used at outlying stations as part of a central protection alarm system need conform to only the following 2 standards:

(i) The minimum on-beam forward gain must be at least 10 dBi, and

(ii) The minimum front-to-back ratio must be at least 20 dB.

⁴ Omnidirectional antennas may be authorized in the band 2150–2160 MHz.

⁵ These antenna standards apply to all point-to-point stations authorized after June 1, 1997. Existing licensees and pending applicants on that date are grandfathered and need not comply with these standards.

⁶ These antenna standards apply to all point-to-point stations authorized on or before June 1, 1997.

⁷ Except for antennas between 140° and 180° authorized or pending on January 1, 1989, in the band 10,550 to 10,565 MHz for which minimum radiation suppression to angle (in degrees) from centerline of main beam is 36 decibels.

⁸ These antenna standards apply only to DEMS User Stations licensed, in operation, or applied for prior to July 15, 1993.

⁹ Except for temporary-fixed operations in the band 13200–13250 MHz with output powers less than 250 mW and as provided in § 101.147(q).

¹⁰ DEMS User Station antennas in this band must meet performance Standard B and have a minimum antenna gain of 34 dBi. The maximum beamwidth requirement does not apply to DEMS User Stations. DEMS Nodal Stations need not comply with these standards.

¹¹ Except as provided in § 101.147(t).

Note to footnote 11: Stations must employ an antenna that meets the performance standards for Category A, except that in areas not subject to frequency congestion, antennas meeting standards for Category B may be employed. Note, however, that the Commission may require the use of high performance antennas where interference problems can be resolved by the use of such antennas.

¹² The minimum front-to-back ratio shall be 38 dBi.

¹³ Mobile, except aeronautical mobile, stations need not comply with these standards.

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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018-AC83

Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the San Diego Fairy Shrimp

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: The U.S. Fish and Wildlife Service (Service) determines endangered status pursuant to the Endangered Species Act of 1973, as amended (Act), for the San Diego fairy shrimp (*Branchinecta sandiegonensis*). This animal is restricted to vernal pools in southwestern coastal California and extreme northwestern Baja California, Mexico. Less than 81 hectares (ha) (200 acres (ac)) of habitat likely remains. This species is imperiled by a variety of factors including: habitat destruction and fragmentation from urban development and agricultural conversion, alterations of vernal pool hydrology, off-road vehicle (ORV)

activity, and livestock overgrazing. This rule implements Federal protection and recovery provisions afforded by the Act. **EFFECTIVE DATE:** February 3, 1997.

ADDRESSES: The complete file for this final rule is available for public inspection, by appointment, during normal business hours at the Carlsbad Field Office, U.S. Fish and Wildlife Service, 2730 Loker Avenue West, Carlsbad, California 92008.

FOR FURTHER INFORMATION CONTACT: Chris Nagano or Susan Wynn at the above address (telephone 619/431-9440).

SUPPLEMENTARY INFORMATION:

Background

The San Diego fairy shrimp is a member of the aquatic crustacean order Anostraca. The species was first collected in Poway and Ramona, San Diego County, in 1962 by J. E. Lynch (Fugate 1993). Michael Fugate (1993) described *Branchinecta sandiegonensis* based on collections that he and Marie Simovich made at Del Mar Mesa in San Diego County. The species is restricted to vernal pools in coastal southern California south to extreme northwestern Baja California, Mexico. No individuals have been found in riverine waters, marine waters, or other permanent bodies of water. All known localities are below 700 meters (m) (2,300 feet (ft)) and within 65 kilometers (km) (40 miles (mi)) of the Pacific

Ocean, from Santa Barbara County south to northwestern Baja California. The majority of the vernal pools in this region, including many which likely served as habitat for the species, were destroyed prior to 1990. Between 1979 and 1986, approximately 68 percent of the privately owned vernal pools under the City of San Diego's jurisdiction were destroyed (Wier and Bauder 1991).

Adult male San Diego fairy shrimp range in length from 9 to 16 mm (0.4 to 0.6 inches (in.)) and the females are 8 to 14 mm (0.4 to 0.5 in.) long. Mature individuals have a delicate elongate body, large stalked compound eyes, no carapace (shell covering the back), and 11 pairs of swimming legs. They swim or glide gracefully upside down by means of complex beating movements of the legs that pass in a wave-like front-to-back direction. Nearly all species of fairy shrimp feed on algae, bacteria, protozoa, rotifers, and bits of organic matter (Eng *et al.* 1990, Pennak 1989). The second pair of antennae in adult female San Diego fairy shrimp are cylindrical and elongate, but in the males they are greatly enlarged and specialized for clasping the females during copulation. The females carry their eggs in an oval or elongate ventral brood sac.

Five other species of branchinectid fairy shrimp occur in southern California (Simovich and Fugate 1992). The only other branchinectids in southern California that are similar in