ENGINEERING STATEMENT AND WAIVER REQUEST

The following materials have been prepared on behalf of Achievement Radio Holdings, Inc., licensee of WBPS(AM), Dedham, Massachusetts.

WPBS operates on 890 kHz using 25 kilowatts in the daytime and 3.4 kilowatts in the nighttime. Both modes employ a five-tower directional antenna with different patterns for day and night (DA-2).

The instant application proposes to change the electrical parameters of the daytime antenna pattern to increase stability. The power is not changed, making this a "minor change" under Part 73.3571(a)(2) of FCC Rules. The instant proposal is therefore not subject to the Commissions present "freeze" on major change applications and may be processed immediately.

The instant application pertains only to the daytime facility. No changes are proposed herein to the night facility.

HISTORICAL BACKGROUND

WBPS operates from an array of five towers located near Ashland, Massachusetts. However, those towers were not originally constructed for the WBPS, 890 kHz facility. Rather, they were originally proposed by the Consulting engineering firm of Carl Smith & Associates for WGTR(AM), Natick, Massachusetts, which operated on 1060 kHz. In the early 1990's, WBPS's prior owner acquired a Construction Permit for 890 kHz and proposed to relocate the 890 kHz authorization to the WGTR towers. The WGTR license [then WBIV and now WJLT] was then sold to Langer Broadcasting, which moved the 1060 kHz facility to another location.

While the ownership issues are tangential, the core fact is that the geometry of the present towers was not established for the present channel of 890 kHz. The tower geometry was established for the previous frequency of 1060 kHz and the present array design was "force-fit" on an existing physical arrangement. While a design was synthesized which met all of the 890 kHz allocation protections required in FCC Part 73.37(a), the fact that the towers were not in a physical placement easily adapted to 890 kHz caused the antenna design to be far from ideal.

The WBPS daytime array has an RSS/RMS ratio of 3.489-to-1. As the Commission is well aware, the RSS/RMS ratio is an indicator of the inherent, mathematical stability of a particular design. Higher numbers indicate decreased stability. The ratio of 3.489-to-1 is uncommonly high and indicates an antenna which, at its most basic mathematical roots, is inherently unstable.

Citing drift in the array, WBPS requested an STA for operation of the array with "parameters at variance" on June 17th, 1998. The Commission granted that request on July 17th, 1998.

During the STA period, WBPS contracted for an extensive mathematical evaluation of the antenna. That evaluation concluded that the root problem was one of mathematical sensitivity rather than an inadequacy of attention to the array. Further, the study indicated that if WBPS followed the customary path, 1) to readjust the array, 2) to perform a partial proof, and 3) to file a new Form 302 application, it was likely that the measures would not have lasting benefit. To the contrary, it was likely that the process would repeat itself again and again, causing additional work for both WBPS and the Commission's engineering staff.

In a letter dated September 17, 1998, WBPS proposed to the Commission to redesign the array in a way that was inherently more stable and which was more likely to stay in adjustment for reasonable periods of time. Rather than implementing a stopgap measure, WBPS proposed to correct the root problem. In the same letter, WBPS asked for additional time to synthesize the improved array design and to prepare the Form 301 application and exhibits. The Commission approved of WBPS's plan and extended the STA to expire on February 3, 1999. [See the November 3, 1998 letter from Edward P. De La Hunt to Joshua W. Resnik, Esq. at the rear of this report at Appendix A.]

WBPS HAS KEPT ITS PROMISE

The instant proposal is that replacement antenna design which WBPS promised to the Commission in its extension request of September 17th. The proposed array design has an RSS/RMS ratio of 1.989-to-1, which is 57% of the present ratio. This reduction will significantly increase the stability of the daytime, directional antenna. It is also significant that the "Q" of the array was reduced from 172.8 mV/m to 101.2 mV/m while the carrier power was unchanged at 25 kilowatts.

The instant proposal uses the five existing towers in their present location. No construction or physical modification is proposed. The only change is the electrical excitation to the towers: the drive currents and phase angles.

The shape of the new pattern is very similar to the shape of the Licensed pattern. The minor lobe at 270 degrees True is enlarged on the proposed pattern, relative to the Licensed pattern. However, this was an artifact of increasing the stability and not an intended difference.

The proposed pattern also "flares" slightly more quickly in the main lobe than does the Licensed pattern. [See the polar plot at Exhibit A-3.] That is, the Standard Field of the proposed design slightly exceeds the Standard Field of the Licensed design between 22 and 70 degrees True. This condition also was an artifact of increasing the stability and not an intended difference. Given the deep and broad suppression required between 330 degrees True and 30 degrees True to protect Nashua, New Hampshire, this was the best match of the main lobes possible without moving one or more of the towers.

(Because this is an "in-line" array and because in-line arrays always generate mirror-image, symmetrical patterns, the condition described above between 22 and 70 degrees True is also true between 158 and 110 degrees True.)

Exhibit F shows that the service provided by the proposed array is nearly identical to that provided by the Licensed array. There is little difference between the commercial values of the two patterns. The sole effect of the instant proposal is to increase stability.

CRITICAL HOURS PROTECTION

WBPS protects WLS(AM), Chicago, Illinois during Critical Hours. WLS is the Class A, "dominant" station on 890 kHz. Exhibit A shows that the maximum radiation toward any point on the WLS, 0.1 mV/m daytime groundwave contour during Critical Hours is 973.8 mV/m (at 270 degrees True). Exhibit J shows that the maximum permissible radiation toward WLS is 997.4 mV/m. The Standard Field of the proposed pattern is 97.6% of the permissible value, in compliance with Part 73.187 of FCC Rules.

GROUNDWAVE ALLOCATION MATTERS

WBPS must provide groundwave protection to stations on 860 through 920 kHz. There are no stations on 860, 870, 890, 910 or 920 which are sufficiently close to require study. [WQDY(AM) at Calais, Maine moved from 890 kHz to 1230 kHz more than a decade ago and the 890 kHz database entry at Calais is a "placeholder" for Canadian coordination purposes only. Domestic protection of this entry is not required.]

Exhibit G-3 shows that there are three stations on first-adjacent channels which must be considered:

1)	WMVU	900 kHz	Nashua, New Hampshire
2)	WJJB (recently WCLZ)	900 kHz	Brunswick, Maine
3)	WCBS	880 kHz	New York, New York

Exhibits G-3A and G-3B are detail showings of the allocation situation between WBPS and WMVU. Exhibit G-3A shows that the proposed WBPS 0.25 mV/m contour fully protects the 0.5 mV/m contour of WMVU. Exhibit G-3B shows that the proposed WBPS 0.5 mV/m contour does not overlap the 0.25 mV/m contour of WMVU. Further, the instant proposal eliminates a small existing overlap between WBPS and WMVU.

Exhibits G-3C and G-3D are detail showings of the allocation situation between WBPS and WCBS. Exhibit G-3C shows the creation of a small area of ***received*** interference from WCBS due to an extended saltwater propagation path for the WCBS signal. The 9.2 square kilometers of contour overlap is along the southern coast of Massachusetts, near Interstate-195 and near the town of New Bedford. [See the far right-center of Exhibit G-3C.] A waiver of Part 73.37(a) is hereby requested for this contour overlap. Justification and precedent for this request are furnished in the section below.

Exhibit G-3D shows an increase of 34.4 square kilometers in an existing area of ***caused*** interference to WCBS due to an extended saltwater propagation path for the WCBS signal. Exhibit G-3D shows that the WCBS 0.5 mV/m contour and the licensed WBPS 0.25 mV/m contour presently overlap over most of the Island of Martha's Vineyard. The proposed facility would enlarge the existing overlap to include the eastern edge of the island. [See the far right-center of Exhibit G-3D.] A waiver of Part 73.37(a) is hereby requested for this increase in contour overlap. Justification and precedent for this request are furnished in the section below.

Exhibit G-3E shows a small increase in an existing area of ***received*** interference from WJJB due to an extended saltwater propagation path for the WJJB signal. The area of increase is east of I-95 and just south of the New Hampshire/Massachusetts state line. [See the lower-center of Exhibit G-3E.] The proposed facility would enlarge the existing overlap by 12 square kilometers. A waiver of Part 73.37(a) is hereby requested for this contour overlap. Justification and precedent for this request are furnished in the section below.

JUSTIFICATION FOR REQUESTED WAIVERS

WBPS has requested waivers of Part 73.37(a) for three areas of contour overlap. All three areas of overlap are small. All three are caused by long saltwater propagation paths.

	PRESENT OVERLAP	PROPOSED OVERLAP	NET INCREASE
WBPS 0.25/WCBS 0.5	0.0 sq. km	9.2 sq. km	9.2 sq. km
WBPS 0.5/WCBS 0.25	93.0 sq. km	127.4 sq. km	34.4 sq. km
WBPS 0.5/WJJB 0.25	212 sq. km	224 sq. km	12 sq. km

The first requested waiver (WBPS 0.25 mV/m contour to WCBS 0.5 mV/m contour) closely parallels the facts in BP-951120AB [WJLT(AM), Natick, MA (then WBIV)]. See attached October 24, 1996 letter from Dennis Williams to Allan G. Moskowitz, Esq. at the rear of this report at Appendix B.

Both WBPS and WJLT are Class B stations in the suburban Boston area. The 0.25 mV/m contours of both stations overlap the 0.5 mV/m contours of first-adjacent channel, Class A stations licensed to New York City. [WJLT overlapped WEVD. WBPS overlaps WCBS.] Both overlaps are more than 270 kilometers from the towers of the New York stations. Both overlaps are due entirely to long saltwater paths up the Long Island Sound. See Exhibit G-3 and the second page of Exhibit H-2. Between 0 and 90 degrees True, the distance to the WCBS 0.5 mV/m contour ranges between 96 and 168 kilometers except for the span between 70 and 82.5 kilometers. Through this span, the contour suddenly juts out to 279 kilometers. The shape of the WCBS contours in the lower-center of Exhibit G-3 leave no doubt that the overlap is cause by saltwater.

In the WJLT case, the Commission determined that "[T]he alleged overlap area between WBIV's [now WJLT] proposed 0.25 mV/m interfering contour and WEVD's 0.5 mV/m protected contour is caused by the long saltwater path and is not located in WEVD's primary service area. Langer's request for a waiver of Part 73.37(a) IS **GRANTED.**" Both conditions that justified the WJLT waiver are present here.

The second and third requested waivers (small increases in ***received*** contour overlaps between the proposed WBPS 0.5 mV/m contour and the 0.25 mV/m contours of WCBS and WJJB) have elements in common with the grant of WVCH, Chester, Pennsylvania. [See *WVCH Communications, Inc.*, 4 FCC Rcd at 2698.] The Commission found that small increases in received interference were acceptable to the Commission when accompanied by offsetting benefits to the public. Again in the case of WCHB(AM), Taylor, Michigan, [See the attached October 30, 1996 letter from Linda Blair to Lauren A. Colby, Esq. at the rear of this report as Appendix C.] the Commission concluded that a waiver of the strict "go-no go" acceptability criteria could be warranted when the overall proposal brought with it offsetting benefits.

In the instant case, one offsetting benefit is an antenna with greater stability and greater bandwidth.

While all Commission allocation policy is based on consideration of the contour location only at carrier frequency (f_0), it is well known that the shape of a directional pattern will change with modulation frequency. Because the electrical spacings of the towers change unavoidably with frequency, the polar pattern envelope calculated by the method in Part 73.150 of FCC Rules is valid only at f_0. In the upper and lower sidebands, the polar pattern shape can be quite different. The inclination of an antenna design to change polar shape with frequency is know as "pattern bandwidth". Antennas with high RSS/RMS ratios (such as the <u>licensed</u> WBPS) generally exhibit poor pattern bandwidth. Antennas with low RSS/RMS ratios (such as the <u>proposed</u> WBPS) generally exhibit good pattern bandwidth. Antennas with high RSS/RMS ratios have much more energy in the sidebands than do antennas with low RSS/RMS. Accordingly, high RSS/RMS antennas are generally more disruptive to first-adjacent channel allocations.

While consideration of the pattern shape only at f_0 may indicate that the instant proposal will result in a slight increase in contour overlap. In a practical sense, the proposed antenna will have lower sideband energy and will therefore have less impact on the first-adjacent operations of both WCBS and WMVU than does the licensed antenna.

Additionally, grant of the requested waivers is expected to reduce future additional work for both WBPS and the Commission's engineering staff by implementing a permanent solution to the antenna instability problem.

WBPS expended great efforts in the design of the instant antenna design. Literally weeks of computer time were spent optimizing the design to match the licensed Standard Pattern envelope. An exact match was not possible without changes in the physical arrangement of the present towers. The slightly faster "flare" of the proposed pattern shown in Exhibit A-3 could not be removed without violating the required protection ot Nashua, New Hampshire. The instant proposal is the best pattern which can be generated from the towers in their present locations.

The three proposed overlaps, individually and collectively, are *de minimis*. The net increases are 9.2, 34.4 and 12 square kilometers. Together, the increases total less than 56 square kilometers.

BASIS FOR CONTOURS

The FCC engineering record for WBPS is monstrous. By itself, it fills three (3) large folders. Additionally, the WBPS allocation is based on a large number of field measurements performed on the 1060 kHz facility which formerly occupied the WBPS towers (WJLT, formerly WBIV, formerly WGTR). The WJLT engineering record fills five (5) additional large folders. Together, the WBPS and WJLT engineering records are over **two feet** in length.

No fewer than five engineering consultants have submitted engineering 301's, 301 amendments and 302's for facilities on these towers. During the same period, there have been five different owners of those facilities. The consistency found in an engineering file where there has been a single, long-term owner and/or a single engineer are not found in the WBPS and WJLT engineering records. To the contrary, the records are fragmented and contradictory.

The Form 301 application (and several engineering amendments) which led to the grant of the licensed WBPS included dozens of measured radials. These radials are scattered through both the WBPS and WJLT records. Some data was nearly illegible due to poor copy quality and other data was contradictory. We have attempted to be thorough and responsible in our search to collect all available, measured data. In the end it was less a question of whether one had collected all of the available data than it was a question of what to believe.