

ENGINEERING EXHIBIT

Application for Digital Television Station Construction Permit

prepared for

Hearst Stations Inc.
WCVB-TV Boston, MA
Facility ID 65684
Ch. 33 1000 kW 388 m

Hearst Stations Inc. (“*Hearst*”) is the licensee of digital television station WCVB-TV, Channel 33, Facility ID 65684, Boston MA. WCVB-TV is licensed (file# 0000117945) to operate with 922 kW effective radiated power (“ERP”) at 388 meters antenna height above average terrain (“HAAT”). *Hearst* proposes herein to increase the ERP to 1000 kW.

WCVB-TV will continue to employ the existing broadband shared antenna system utilized by the licensed WCVB-TV facility. The antenna is top-mounted on a tower structure which corresponds to FCC Antenna Structure Registration number 1003433. No change to the overall structure height will result.

The antenna is an elliptically polarized nondirectional RFS model PEP70E-O5-2-T. *Hearst* will employ 20 percent vertical polarization for WCVB-TV, such that the horizontally polarized ERP is 1000 kW and the vertically polarized ERP is 200 kW.¹

Figure 1 supplies a map that demonstrates compliance with §73.625(a)(1) regarding coverage of the entire principal community. The proposed facility’s predicted population exceeds 95 percent of the baseline facility’s population as described in the *Incentive Auction Closing and Channel Reassignment Public Notice* (“*CCRPN*”, DA 17-317, released April 13, 2017).

¹The antenna provides for adjustable vertical polarization. The antenna provides separate inputs for horizontally polarized and vertically polarized radiators, which permits each of the television stations that share the antenna to individually choose how much vertical polarization to utilize.

The proposed facility expands the WCVB-TV service contour beyond that established by the *CCRPN*. Interference study per FCC OET Bulletin 69² shows that the proposal complies with the 0.5 percent limit of new interference caused to pertinent nearby full service and Class A television stations and reassignments as required by §73.616. FCC processing of this proposal is requested using a **2.0 km cell size and 0.5 km terrain profile increment**. The interference study output report is provided as Table 1.

The proposed 1000 kW ERP exceeds the maximum allowed for the proposed antenna HAAT of 388 meters permitted by §73.622(f)(8)(i). Section 73.622(f)(5) permits the maximum ERP to be exceeded in order to provide the same geographic coverage area as the largest station within the same market. As demonstrated in Figure 2, the total area within the proposed WCVB-TV NLSC is 34,677 square kilometers, which does not exceed the 35,175 sq. km NLSC area of WGBH-TV (Ch. 5, Boston MA, file# 0000080062). Thus, the 1000 kW ERP specified herein complies with §73.622(f)(5) of the FCC's Rules.

Human Exposure to Radiofrequency Electromagnetic Field (Environmental)

The proposed operation was evaluated for human exposure to RF energy using the procedures outlined in the FCC's OET Bulletin Number 65. Based on OET-65 equation (10), and considering 10 percent antenna relative field in downward elevations (pattern data shows less than 10 percent relative field at angles 10 to 90 degrees below the antenna), the calculated signal density near the tower at two meters above ground level attributable to the proposed facility is $2.7 \mu\text{W}/\text{cm}^2$, which is 0.7 percent of the general population/uncontrolled maximum permitted exposure limit. This is well below the five percent threshold limit described in §1.1307(b) regarding sites with multiple emitters, categorically excluding the applicant from responsibility for taking any corrective action in the areas where the proposal's contribution is less than five percent.

²FCC Office of Engineering and Technology Bulletin number 69, *Longley-Rice Methodology for Evaluating TV Coverage and Interference*, February 6, 2004 ("OET-69"). This analysis employed the FCC's current "TVStudy" software with the default application processing template settings, 2 km cell size, and 0.5 km terrain increment. Comparisons of various results of this computer program (run on a Mac processor) to the FCC's implementation of TVStudy show excellent correlation.

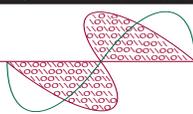
The general public will not be exposed to RF levels attributable to the proposal in excess of the FCC's guidelines. RF exposure warning signs will continue to be posted. With respect to worker safety, the applicant will coordinate exposure procedures with all pertinent stations and will reduce power or cease operation as necessary to protect persons having access to the site, tower, or antenna from RF electromagnetic field exposure in excess of FCC guidelines. This exhibit is limited to the evaluation of exposure to RF electromagnetic field. No increase in structure height is proposed.

List of Attachments

Figure 1	Proposed Coverage Contours
Figure 2	Maximum ERP per §73.622(f)
Table 1	TVStudy Analysis of Proposal
Form 2100	Saved Version of Engineering Sections from FCC Form at Time of Upload

Chesapeake RF Consultants, LLC

Joseph M. Davis, P.E.	November 23, 2020	
207 Old Dominion Road	Yorktown, VA 23692	703-650-9600

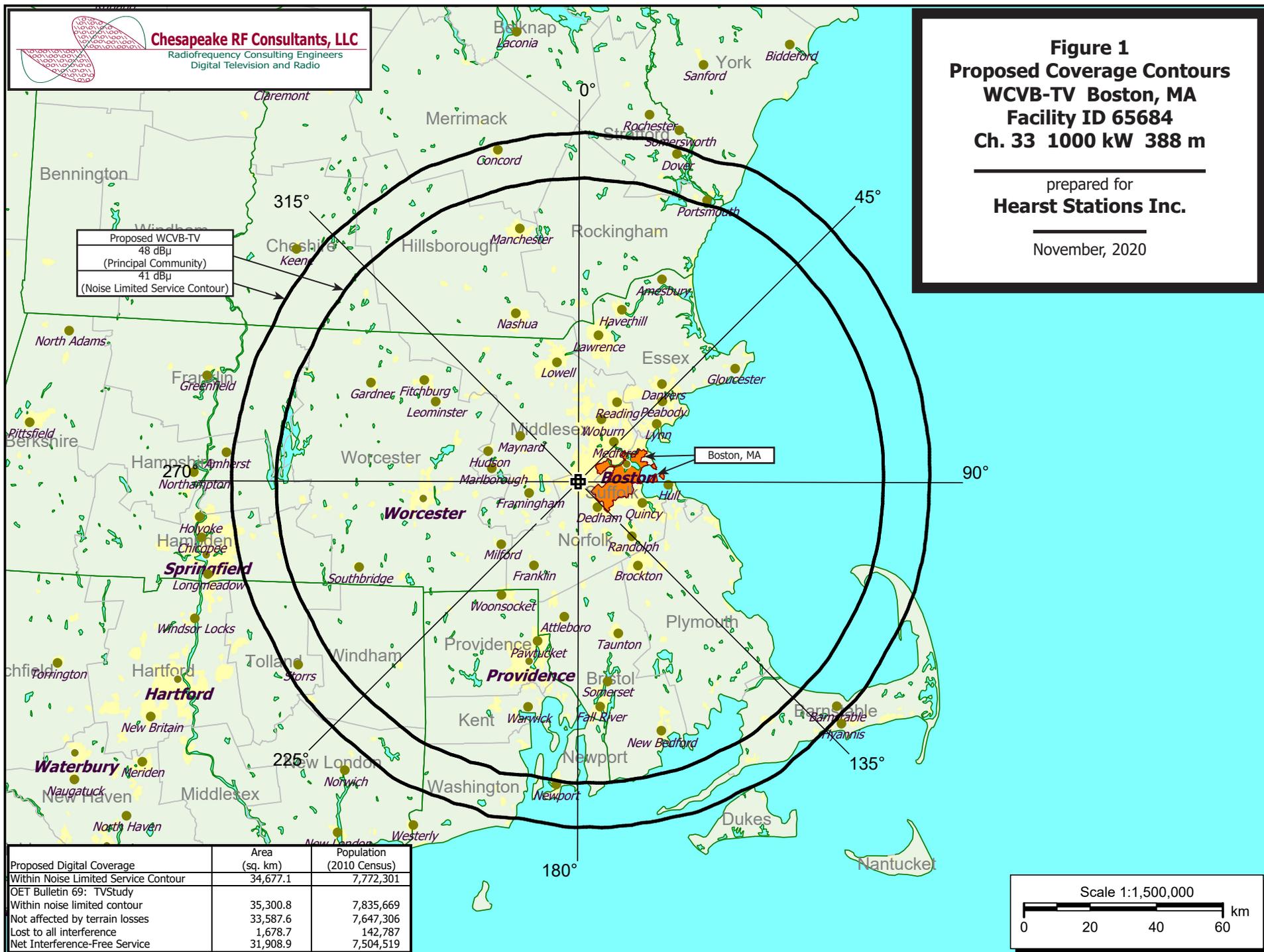


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 Radiofrequency Consulting Engineers
 Digital Television and Radio

Figure 1
Proposed Coverage Contours
WCVB-TV Boston, MA
Facility ID 65684
Ch. 33 1000 kW 388 m

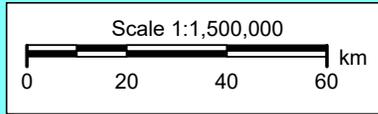
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Hearst Stations Inc.

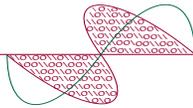
November, 2020



Proposed WCVB-TV
 48 dBu
 (Principal Community)
 41 dBu
 (Noise Limited Service Contour)

Proposed Digital Coverage	Area (sq. km)	Population (2010 Census)
Within Noise Limited Service Contour	34,677.1	7,772,301
OET Bulletin 69: TVStudy		
Within noise limited contour	35,300.8	7,835,669
Not affected by terrain losses	33,587.6	7,647,306
Lost to all interference	1,678.7	142,787
Net Interference-Free Service	31,908.9	7,504,519



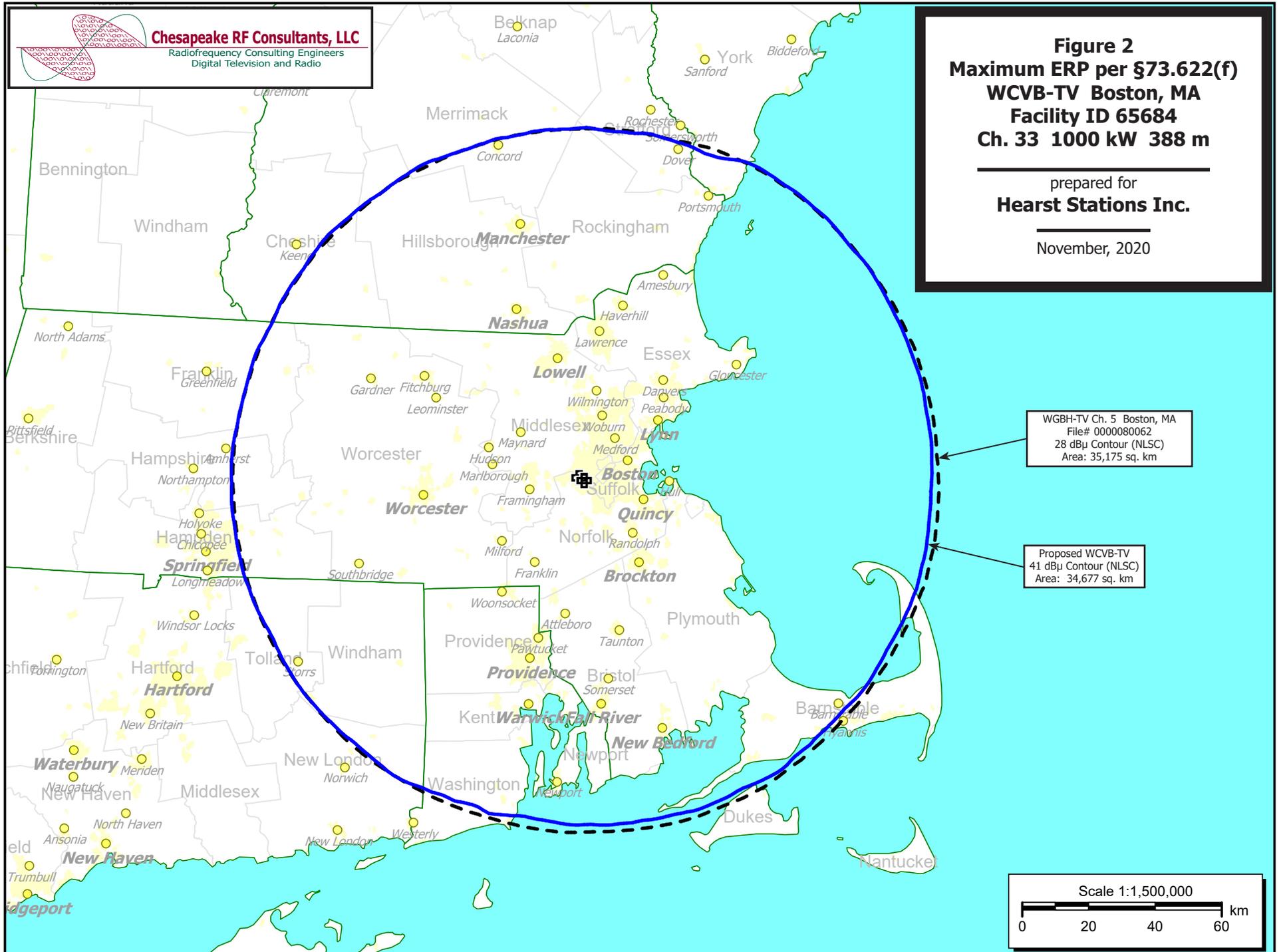


Chesapeake RF Consultants, LLC
 Radiofrequency Consulting Engineers
 Digital Television and Radio

Figure 2
Maximum ERP per §73.622(f)
WCVB-TV Boston, MA
Facility ID 65684
Ch. 33 1000 kW 388 m

prepared for
Hearst Stations Inc.

November, 2020



WGBH-TV Ch. 5 Boston, MA
 File# 0000080062
 28 dBu Contour (NLSC)
 Area: 35,175 sq. km

Proposed WCVB-TV
 41 dBu Contour (NLSC)
 Area: 34,677 sq. km

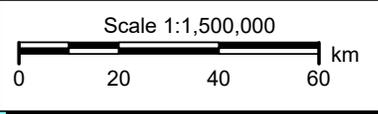


Table 1 WCVB-TV TVStudy Analysis of Proposal
 (page 1 of 3)



tvstudy v2.2.5 (4uoc83)

Database: localhost, Study: WCVB-TV Ch33 1000kW_2.0-0.5, Model: Longley-Rice
 Start: 2020.11.23 09:59:20

Study created: 2020.11.23 09:59:20

Study build station data: LMS TV 2020-11-23

Proposal: WCVB-TV D33 DT APP BOSTON, MA
 File number: WCVB-TV Ch33 1000kW
 Facility ID: 65684
 Station data: User record
 Record ID: 3308
 Country: U.S.
 Zone: I

Search options:

Baseline record excluded if station has CP

Stations potentially affected by proposal:

IX	Call	Chan	Svc	Status	City, State	File Number	Distance
No	WGBX-TV	D32	DT	LIC	BOSTON, MA	BLANK0000117890	0.0 km
No	WETK	D32	DT	LIC	BURLINGTON, VT	BLEDT20061011ADW	277.2
Yes	WCCT-TV	D33	DT	LIC	WATERBURY, CT	BLANK0000080031	148.0
No	WPSG	D33	DT	CP	PHILADELPHIA, PA	BLANK0000034323	419.2
No	WQFX-TV	D33	DT	LIC	SCRANTON, PA	BLANK0000080158	384.0
Yes	WTIC-TV	D34	DT	LIC	HARTFORD, CT	BLANK0000080032	148.0
Yes	WFXT	D34	DT	LIC	BOSTON, MA	BLANK0000080060	1.7
No	WPXT	D34	DT	LIC	PORTLAND, ME	BLANK0000107908	175.0

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

Channel: D33
 Latitude: 42 18 37.00 N (NAD83)
 Longitude: 71 14 12.00 W
 Height AMSL: 431.9 m
 HAAT: 388.3 m
 Peak ERP: 1000 kW
 Antenna: Omnidirectional
 Elev Pattn: Generic
 Elec Tilt: 0.75

40.6 dBu contour:

Azimuth	ERP	HAAT	Distance
0.0 deg	1000 kW	386.1 m	105.8 km
45.0	1000	414.3	108.4
90.0	1000	394.6	106.6
135.0	1000	391.9	106.3
180.0	1000	375.2	104.8
225.0	1000	380.1	105.3
270.0	1000	380.2	105.3
315.0	1000	383.7	105.6

ERP exceeds maximum

ERP: 1000 kW ERP maximum: 922 kW

**Proposal 25.60 dBu contour crosses Canadian border, coordination required
 Distance to Canadian border: 301.2 km

Distance to Mexican border: 2959.8 km

Conditions at FCC monitoring station: Belfast ME
 Bearing: 35.5 degrees Distance: 294.3 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:
 Bearing: 276.7 degrees Distance: 2832.3 km

Table 1 WCVB-TV TVStudy Analysis of Proposal
 (page 2 of 3)



Study cell size: 2.00 km
 Profile point spacing: 0.50 km

Maximum new IX to full-service and Class A: 0.50%
 Maximum new IX to LPTV: 2.00%

 Interference to BLANK0000080031 LIC scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	WCCT-TV	D33	DT	LIC	WATERBURY, CT	BLANK0000080031	
Undesireds:	WCVB-TV	D33	DT	BL	BOSTON, MA	DTVBL65684	148.0 km
	WCVB-TV	D33	DT	APP	BOSTON, MA	WCVB-TV Ch33 1000kW	148.0
	WGBX-TV	D32	DT	LIC	BOSTON, MA	BLANK0000117890	148.0
	WLIW	D32	DT	LIC	GARDEN CITY, NY	BLANK0000086492	147.9
	WPSG	D33	DT	CP	PHILADELPHIA, PA	BLANK0000034323	274.1
	WQPX-TV	D33	DT	LIC	SCRANTON, PA	BLANK0000080158	242.5
	WFXT	D34	DT	LIC	BOSTON, MA	BLANK0000080060	149.0
	WPXN-TV	D34	DT	LIC	NEW YORK, NY	BLANK0000086780	147.9
	Service area	Terrain-limited	IX-free, before		IX-free, after		Percent New IX
	32755.0	5,818,471	29620.9	5,393,389	26840.8	4,956,592	26652.0 4,936,711 0.70 0.40
Undesired			Total IX	Unique IX, before		Unique IX, after	
WCVB-TV D33 DT BL	2655.4		420,696	2109.9	254,715		
WCVB-TV D33 DT APP	2852.3		442,770			2298.7	274,596
WGBX-TV D32 DT LIC	196.3		20,008	0.0	0	0.0	0
WLIW D32 DT LIC	56.1		28,400	0.0	0	0.0	0
WPSG D33 DT CP	256.9		74,958	36.4	6,148	32.3	5,449
WQPX-TV D33 DT LIC	140.7		38,413	40.2	4,652	32.2	2,854
WFXT D34 DT LIC	196.3		17,167	16.0	1,161	20.0	1,465
WPXN-TV D34 DT LIC	196.6		118,828	12.1	3,092	12.1	3,092

 Interference to BLANK0000080032 LIC scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	WTIC-TV	D34	DT	LIC	HARTFORD, CT	BLANK0000080032	
Undesireds:	WCVB-TV	D33	DT	BL	BOSTON, MA	DTVBL65684	148.0 km
	WCVB-TV	D33	DT	APP	BOSTON, MA	WCVB-TV Ch33 1000kW	148.0
	WCCT-TV	D33	DT	LIC	WATERBURY, CT	BLANK0000080031	0.0
	WPPX-TV	D34	DT	CP	WILMINGTON, DE	BLANK0000034931	273.8
	WFXT	D34	DT	LIC	BOSTON, MA	BLANK0000080060	149.0
	WPXT	D34	DT	LIC	PORTLAND, ME	BLANK0000107908	291.9
	WPXN-TV	D34	DT	LIC	NEW YORK, NY	BLANK0000086780	147.9
	WFXV	D34	DT	LIC	UTICA, NY	BLANK0000112314	250.3
	WSWB	D34	DT	LIC	SCRANTON, PA	BLANK0000079375	242.7
	WHDH	D35	DT	LIC	BOSTON, MA	BLANK0000088833	149.6
	WNJU	D35	DT	LIC	LINDEN, NJ	BLANK0000079780	147.9
	Service area	Terrain-limited	IX-free, before		IX-free, after		Percent New IX
	32572.7	5,318,753	29078.3	4,800,418	25544.5	4,160,174	25544.5 4,160,174 0.00 0.00
Undesired			Total IX	Unique IX, before		Unique IX, after	
WCVB-TV D33 DT BL	252.5		56,729	4.0	349		
WCVB-TV D33 DT APP	264.6		57,457			4.0	349
WCCT-TV D33 DT LIC	16.2		3,381	8.1	481	8.1	481
WPPX-TV D34 DT CP	48.4		5,173	4.0	151	4.0	151
WFXT D34 DT LIC	2379.6		367,379	1358.8	119,721	1350.8	119,145
WPXT D34 DT LIC	4.0		406	4.0	406	4.0	406
WPXN-TV D34 DT LIC	1866.2		483,104	965.1	234,469	965.1	234,469
WFXV D34 DT LIC	112.4		4,966	60.1	886	60.1	886
WSWB D34 DT LIC	40.2		1,935	0.0	0	0.0	0
WHDH D35 DT LIC	260.5		54,983	12.0	605	8.0	453
WNJU D35 DT LIC	258.2		119,159	0.0	0	0.0	0

 Interference to BLANK0000080060 LIC scenario 1

Table 1 WCVB-TV TVStudy Analysis of Proposal
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Call	Chan	Svc	Status	City, State	File Number	Distance
Desired: WFXT	D34	DT	LIC	BOSTON, MA	BLANK0000080060	
Undesireds: WCVB-TV	D33	DT	BL	BOSTON, MA	DTVBL65684	1.7 km
WCVB-TV	D33	DT	APP	BOSTON, MA	WCVB-TV Ch33 1000kW	1.7
WCCT-TV	D33	DT	LIC	WATERBURY, CT	BLANK0000080031	149.0
WTIC-TV	D34	DT	LIC	HARTFORD, CT	BLANK0000080032	149.0
WPXT	D34	DT	LIC	PORTLAND, ME	BLANK0000107908	175.4
WPXN-TV	D34	DT	LIC	NEW YORK, NY	BLANK0000086780	292.1
WFXV	D34	DT	LIC	UTICA, NY	BLANK0000112314	336.4
WHDH	D35	DT	LIC	BOSTON, MA	BLANK0000088833	0.9

Service area	Terrain-limited	IX-free, before	IX-free, after	Percent New IX
30741.5	7,494,070	29584.6	7,406,046	26276.4
		7,161,946	7,160,061	0.08
				0.03

Undesired	Total IX	Unique IX, before	Unique IX, after
WCVB-TV D33 DT BL	88.0	17,760	36.1
WCVB-TV D33 DT APP	104.0	19,476	56.1
WCCT-TV D33 DT LIC	56.1	2,306	0.0
WTIC-TV D34 DT LIC	1842.5	158,189	134,102
WPXT D34 DT LIC	1505.2	85,141	1381.5
WPXN-TV D34 DT LIC	104.4	3,929	8.0
WFXV D34 DT LIC	60.1	2,644	8.0
WHDH D35 DT LIC	40.0	6,640	12.0

Interference to proposal scenario 1
1.87% interference received

Call	Chan	Svc	Status	City, State	File Number	Distance
Desired: WCVB-TV	D33	DT	APP	BOSTON, MA	WCVB-TV Ch33 1000kW	
Undesireds: WCCT-TV	D33	DT	LIC	WATERBURY, CT	BLANK0000080031	148.0 km
WQPX-TV	D33	DT	LIC	SCRANTON, PA	BLANK0000080158	384.0
WTIC-TV	D34	DT	LIC	HARTFORD, CT	BLANK0000080032	148.0
WFXT	D34	DT	LIC	BOSTON, MA	BLANK0000080060	1.7

Service area	Terrain-limited	IX-free	Percent IX
35300.8	7,835,669	33587.6	7,647,306
		31908.9	7,504,519
			5.00
			1.87

Undesired	Total IX	Unique IX	Prcnt Unique IX
WCCT-TV D33 DT LIC	1670.7	140,455	1514.4
WQPX-TV D33 DT LIC	16.0	1,137	0.0
WTIC-TV D34 DT LIC	152.3	20,714	0.0
WFXT D34 DT LIC	12.0	2,430	8.0

Channel and Facility Information

Section	Question	Response
Proposed Community of License	Facility ID	65684
	State	Massachusetts
	City	BOSTON
	DTV Channel	33
	Designated Market Area	BOSTON (MANCHESTER)
Facility Type	Facility Type	Commercial
	Station Type	Main
Zone	Zone	1

Antenna Location Data

Section	Question	Response
Antenna Structure Registration	Do you have an FCC Antenna Structure Registration (ASR) Number?	Yes
	ASR Number	1003433
Coordinates (NAD83)	Latitude	42° 18' 37.0" N+
	Longitude	071° 14' 12.0" W-
	Structure Type	GTOWER-Guyed Structure Used for Communication Purposes
	Overall Structure Height	395.1 meters
	Support Structure Height	363.4 meters
	Ground Elevation (AMSL)	46.6 meters
Antenna Data	Height of Radiation Center Above Ground Level	385.3 meters
	Height of Radiation Center Above Average Terrain	388.3 meters
	Height of Radiation Center Above Mean Sea Level	431.9 meters
	Effective Radiated Power	1000 kW

**Antenna
Technical Data**

Section	Question	Response
Antenna Type	Antenna Type	Non-Directional
	Do you have an Antenna ID?	
	Antenna ID	
Antenna Manufacturer and Model	Manufacturer:	RFS
	Model	PEP70E-O5-2-T
	Rotation	
	Electrical Beam Tilt	0.75
	Mechanical Beam Tilt	Not Applicable
	toward azimuth	
	Polarization	Elliptical
DTV and DTS: Elevation Pattern	Does the proposed antenna propose elevation radiation patterns that vary with azimuth for reasons other than the use of mechanical beam tilt?	No
	Uploaded file for elevation antenna (or radiation) pattern data	

**Construction
Permit
Certifications**

Section	Question	Response
Post-Incentive Auction Expedited Processing	It will operate on the DTV channel for this station as established in the post-incentive auction channel reassignment public notice.	Yes
	It will operate post-incentive auction facilities that do not expand the noise-limited service contour in any direction beyond that established by the post-incentive auction channel reassignment public notice.	No
	It will operate post-incentive auction facilities that match or reduce by no more than five percent with respect to predicted population from those defined in the post-incentive auction channel reassignment public notice.	Yes
	The antenna structure to be used by this facility has been registered by the Commission and will not require re-registration to support the proposed antenna, OR the FAA has previously determined that the proposed structure will not adversely affect safety in air navigation and this structure qualifies for later registration under the Commission's phased registration plan, OR the proposed installation on this structure does not require notification to the FAA pursuant to 47 C.F.R. Section 17.7.	Yes
Environmental Effect	Would a Commission grant of Authorization for this location be an action which may have a significant environmental effect? (See 47 C.F.R. Section 1.1306)	No
Broadcast Facility	The proposed facility complies with the applicable engineering standards and assignment requirements of 47 C.F.R. Sections 73.616, 73.622(i), 73.623(e), 73.625, 73.1030, and 73.1125.	Yes