

APPLICATION FOR MINOR  
MODIFICATION TO A LICENSED DTV  
BROADCAST STATION  
FCC FILE NO.: BLEDT-20020529ABG  
TO MAXIMIZE AND OPERATE IN THE POST  
DTV TRANSITION PERIOD  
WLED-DT  
UNIVERSITY OF NEW HAMPSHIRE  
LITTLETON, NH

KESSLER & GEHMAN ASSOCIATES, INC.  
TELECOMMUNICATIONS CONSULTING ENGINEERS

20080609

*Prepared by Ryan Wilhour*

*KG&A*

507 N.W. 60th Street, Suite C  
Gainesville, Florida 32607



## **KESSLER AND GEHMAN ASSOCIATES, INC.**

ENGINEERING STATEMENT OF RYAN WILHOUR OF THE FIRM KESSLER AND  
GEHMAN ASSOCIATES, INC., CONSULTING ENGINEERS IN CONNECTION WITH  
AN APPLICATION FOR MINOR MODIFICATION OF A LICENSED DTV  
BROADCAST STATION FCC FILE NUMBER BLEDT-20020529ABG TO MAXIMIZE  
OPERATION IN THE POST DTV TRANSITION PERIOD  
WLED-DT  
UNIVERSITY OF NEW HAMPSHIRE  
LITTLETON, NH

### PROCLAMATION OF ENGINEER

I, Ryan Wilhour, am an associate of Kessler and Gehman Associates, Inc. with offices in Gainesville, Florida. I am a graduate of the University of Florida with a Bachelor of Science degree in electrical engineering.

This firm has been employed by the University of New Hampshire “UNH” to prepare engineering studies and a minor modification application to FCC file number BLEDT-20020529ABG for post DTV transition maximization.

### ATTACHED FIGURES

In carrying out the engineering studies the following attached figures were prepared:

1. Engineering Specifications (Exhibit E1)
2. Elevation drawing of the antenna system (Exhibit E2)
3. USGS 7.5 minute topographic quadrangle showing the proposed transmitter location and the coordinate lines (Exhibit E3)
4. Antenna elevation pattern (Exhibit E4)
5. Map showing the predicted DTV coverage contour relative to the licensed coverage contour. (Exhibit E5)
6. Allocation Analysis (Exhibit E6)
7. Environmental Impact/ RFR Hazard Analysis (Exhibit E7)



### NARRATIVE

UNH, noncommercial licensee of WLED-TV, Channel 49, and WLED-DT, Channel 48, Littleton, New Hampshire, was awarded Channel 48 as its post-transition digital channel. The instant application proposed to make the following changes:

- Increase the maximum ERP from 45kW to 105kW
- Move the transmitter site from North Latitude 44-21-10 West Longitude 71-44-15 to North Latitude 44-16-13 West Longitude 71-18-12
- Increase the effect antenna HAAT from 388 m to 1160.4 m

### ALLOCATION ANALYSIS

It is herein proposed to modify the above referenced channel 48 digital licensed facility to maximize its coverage area without causing impermissible interference to other post DTV transition facilities. The table in Exhibit E6 demonstrates the interference considerations for the proposed facility and further illustrates complete compliance to the 0.5% interference threshold criteria.

### ENVIRONMENTAL IMPACT/RFR HAZARD ANALYSIS

An analysis has been made of the human exposure to RFR using the calculation methodology described in OET Bulletin 65, Edition, 97-01. Exhibit E7A is a RFR study demonstrating that the proposed facility produces RF emissions which exceed 5% of the most restrictive permissible exposure at some locations 2 meters above the ground. Exhibit E7A calculations were made using a frequency of 674 MHz, which is the lower edge of the proposed channel. To account for ground reflections, a coefficient of 1.6 was included in the calculations.

Pursuant to OET Bulletin 65 concerning multiple-user transmitter sites only those licensees whose transmitters produce power density levels greater than 5.0% of the exposure limit are considered significant contributors to RFR. Since the proposed operation is calculated to have a peak of 18.02% of the most permissible exposure at some locations 2 meters above the ground, it is considered a significant contributor to existing RF sources in the vicinity of WLED-DT.

Mt. Washington Peak contains several sources of RFR, Exhibit E7B is a comprehensive RFR on site analysis performed by R. M. Smith Associates, which concludes that the existing facilities are in compliance with the General and Occupational exposure limits. According to the demonstrated charts, an 18.08% increase in RFR will not put any of the



## KESSLER AND GEHMAN ASSOCIATES, INC.

general or occupational exposure limitations over the threshold. It should be noted that adding 18.08% to the “Mode 1” limit around the base of the WHOM antenna tower will put the general exposure limit over the threshold; however, as noted this area is fenced off from public access and is well within the occupation exposure limit. Thus, the instant proposal complies with the FCC limits for human exposure to RF radiation and thus is excluded from further environmental processing.

### DECLARATION OF ENGINEER

The foregoing statement and the report regarding the aforementioned engineering work are true and correct to the best of my knowledge. Executed on June 9, 2008.

The logo for Kessler and Gehman Associates, Inc. (KGA) features the letters 'KGA' in a stylized, serif font. The letters are white and are superimposed on a thick, horizontal gray bar that extends across the width of the logo.

Ryan Wilhour

A handwritten signature in blue ink that reads 'Ryan Wilhour'. The signature is written in a cursive, flowing style.

Consulting Engineer



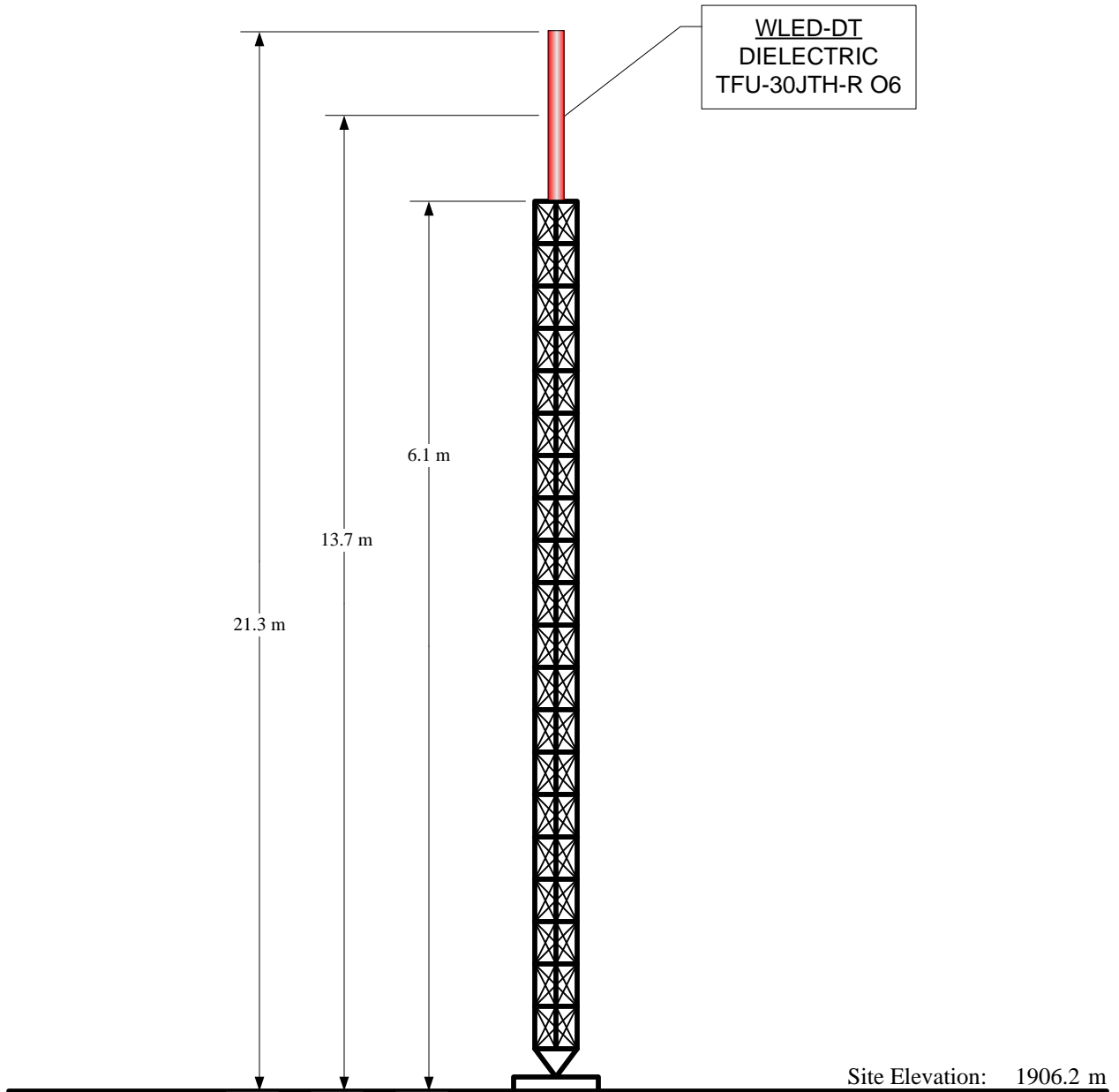
WLED-DT

LITTLETON, NH

ENGINEERING SPECIFICATIONS

- A. Transmitter Site (NAD 27)
- |                            |                          |
|----------------------------|--------------------------|
| North Latitude             | 44 ° 16 ' 13"            |
| West Longitude             | 71 ° 18 ' 12"            |
| Street Address or Location | Atop Mt. Washington Peak |
- B. Proposed Facility
- |             |           |               |
|-------------|-----------|---------------|
| DTV Channel | Number    | 48            |
|             | Frequency | 674 - 680 MHz |
- C. Elevations
- |   |          |
|---|----------|
| Height of Site Above Mean Sea Level (AMSL)  | 1906.2 m |
| Overall Height of Structure Above Ground<br>(including all appurtenances)         | 21.3 m   |
| Overall Height of Structure Above Mean Sea Level<br>(including all appurtenances) | 1927.5 m |
| Effective Height of Antenna Above Ground  | 13.7 m   |
| Effective Height of Antenna Above Average Terrain                                 | 1160.4 m |
| Effective Height of Antenna Above Mean Sea Level                                  | 1919.9 m |
- D. Antenna Parameters – Horizontal Polarization
- |  |          |
|--|----------|
| Maximum Antenna Gain in Beam Maximum     | 13.98 dB |
| Maximum Antenna Gain in Horizontal Plane | 6.33 dB  |
| Maximum Effective Radiated Power         | 20.2 dBk |
| In Beam Maximum                          | 105 kW   |
| Maximum Effective Radiated Power         | 12.6 dBk |
| In Horizontal Plane                      | 18.0 kW  |





Overall Height AGL:	21.3 m
Overall Height AMSL:	1927.5 m
Radiation Center AGL:	13.7 m
Radiation Center AMSL:	1919.9 m
Radiation Center HAAT:	1160.4 m
Average Terrain:	759.5 m

NAD 27 Coordinates:	
N. Latitude:	44° 16' 13"
W. Longitude:	71° 18' 12"

FCC Tower Registration Number:	N/A
FAA Aeronautical Study Number:	N/A

NOTE: NOT TO SCALE

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20080605

EXHIBIT E2





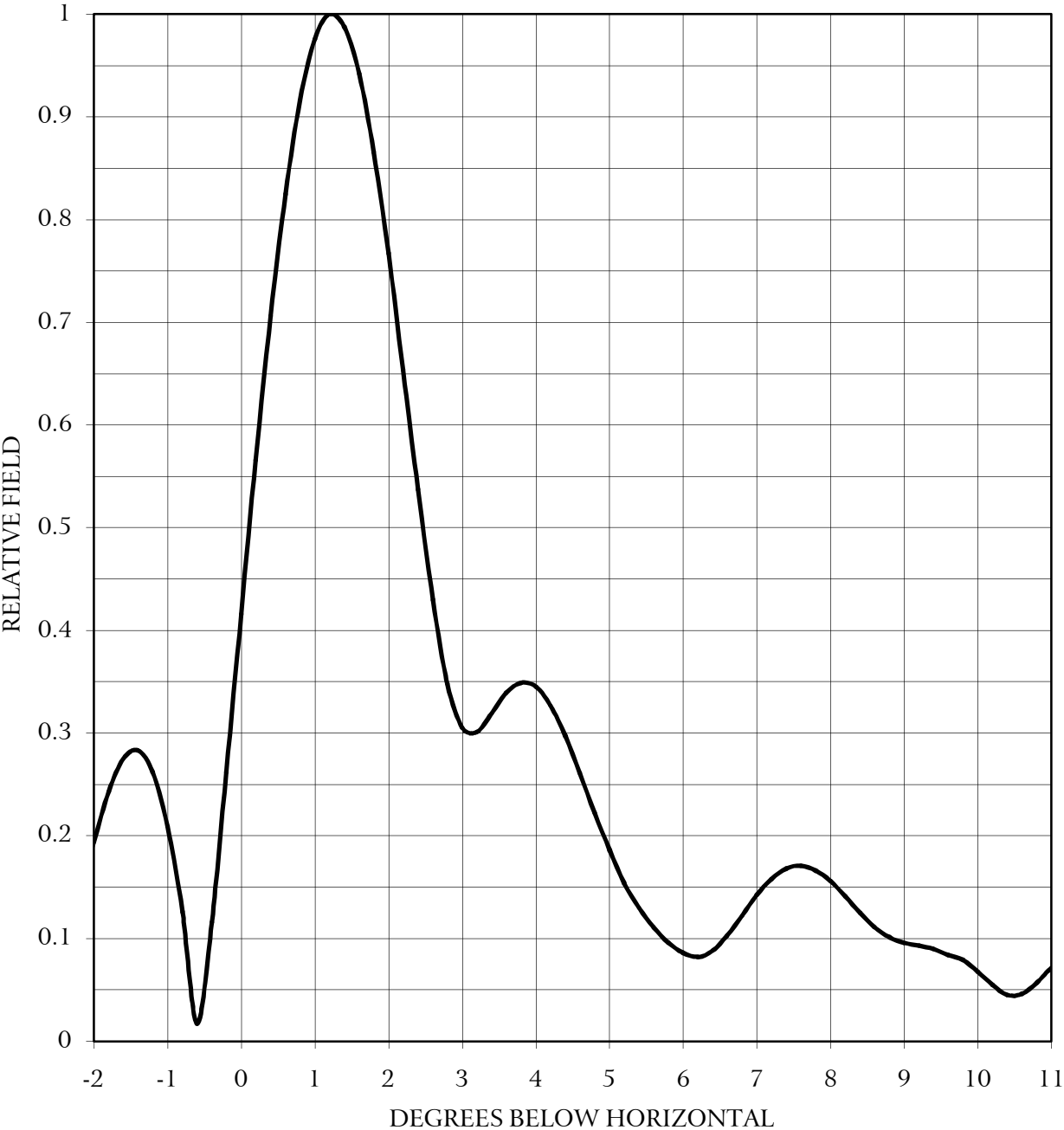


# ELEVATION PATTERN

Dielectric - TFU-30JTH-R O6

RMS Gain at Main Lobe 25.00 (13.98 dBd)  
RMS Gain at Horizontal 4.30 (6.33 dBd)

Beam Tilt 1.25 deg  
Frequency 677.00 MHz



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EXHIBIT E4A

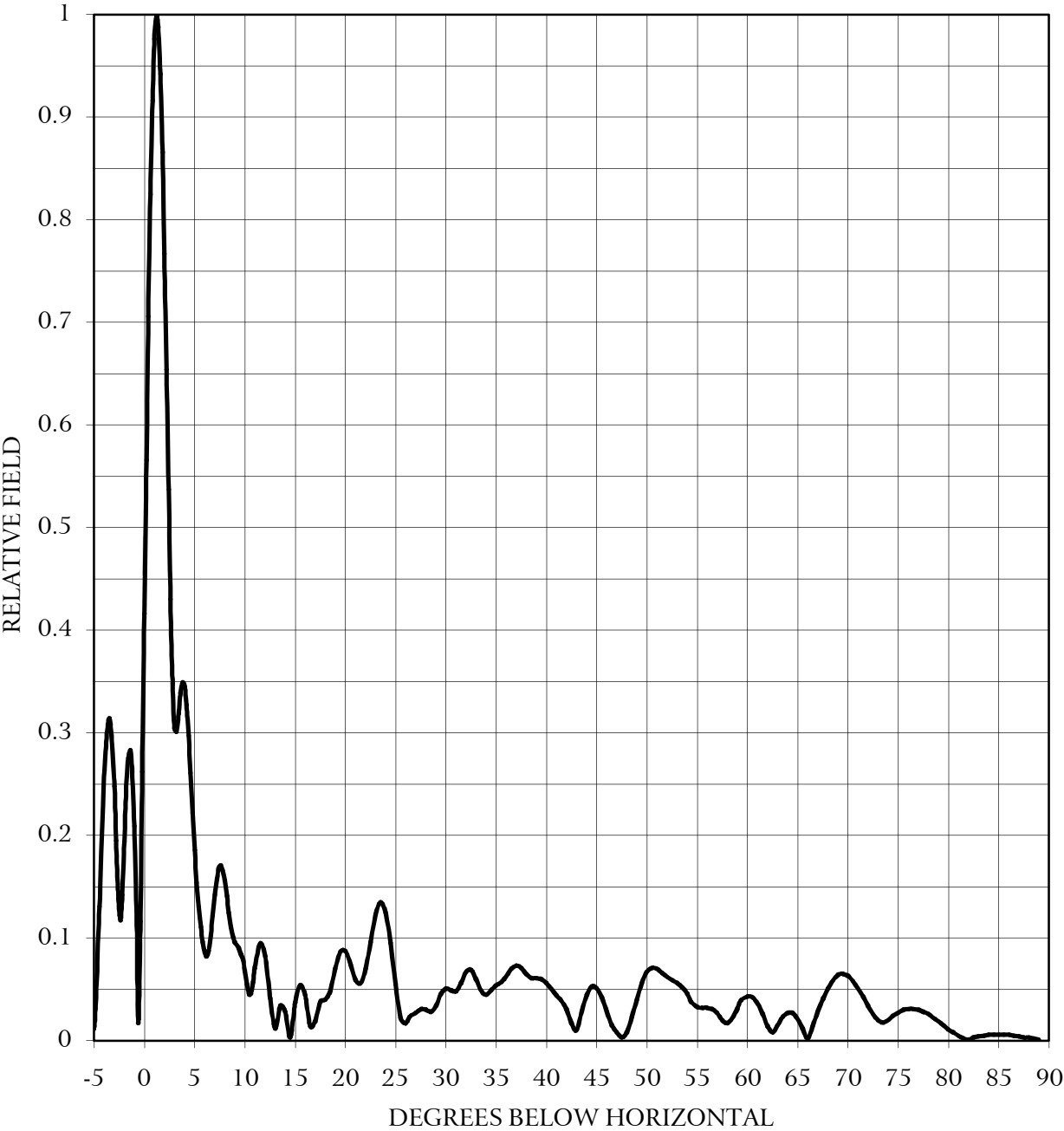


# ELEVATION PATTERN

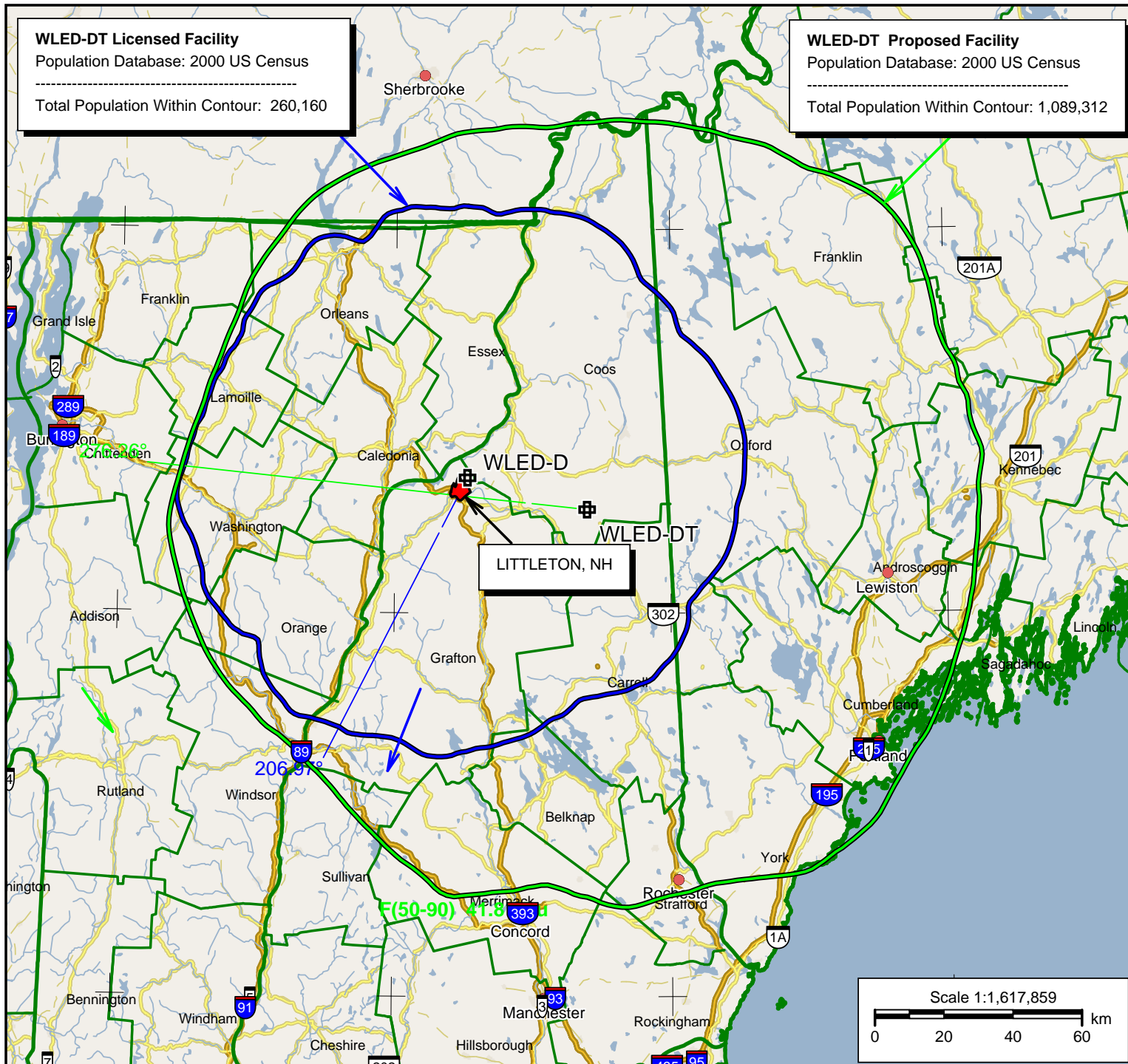
Dielectric - TFU-30JTH-R O6

RMS Gain at Main Lobe 25.00 (13.98 dBd)  
RMS Gain at Horizontal 4.30 (6.33 dBd)

Beam Tilt 1.25 deg  
Frequency 677.00 MHz









Chan	Call	City/State	Ref. No.	New IX
47	WYDN	WORCESTER MA	BDTV-0729	0.0%
48	WRNN-TV	KINGSTON NY	BDTV-1146	0.0%
49	WEKW-TV	KEENE NH	BDTV-1050	0.0%

# Post Transition

## WLED-DT

### PROPOSED

Latitude: 44-16-13 N

Longitude: 071-18-12 W

ERP: 105.00 kW

Channel: 48

Frequency: 677.0 MHz

AMSL Height: 1919.9 m

Elevation: 1889.494 m

Horiz. Pattern: Omni

Vert. Pattern: Yes

Elec Tilt: 0.0

Prop Model: Longley/Rice

Climate: Cont temperate

Conductivity: 0.0050

Dielec Const: 15.0

Refractivity: 301.0

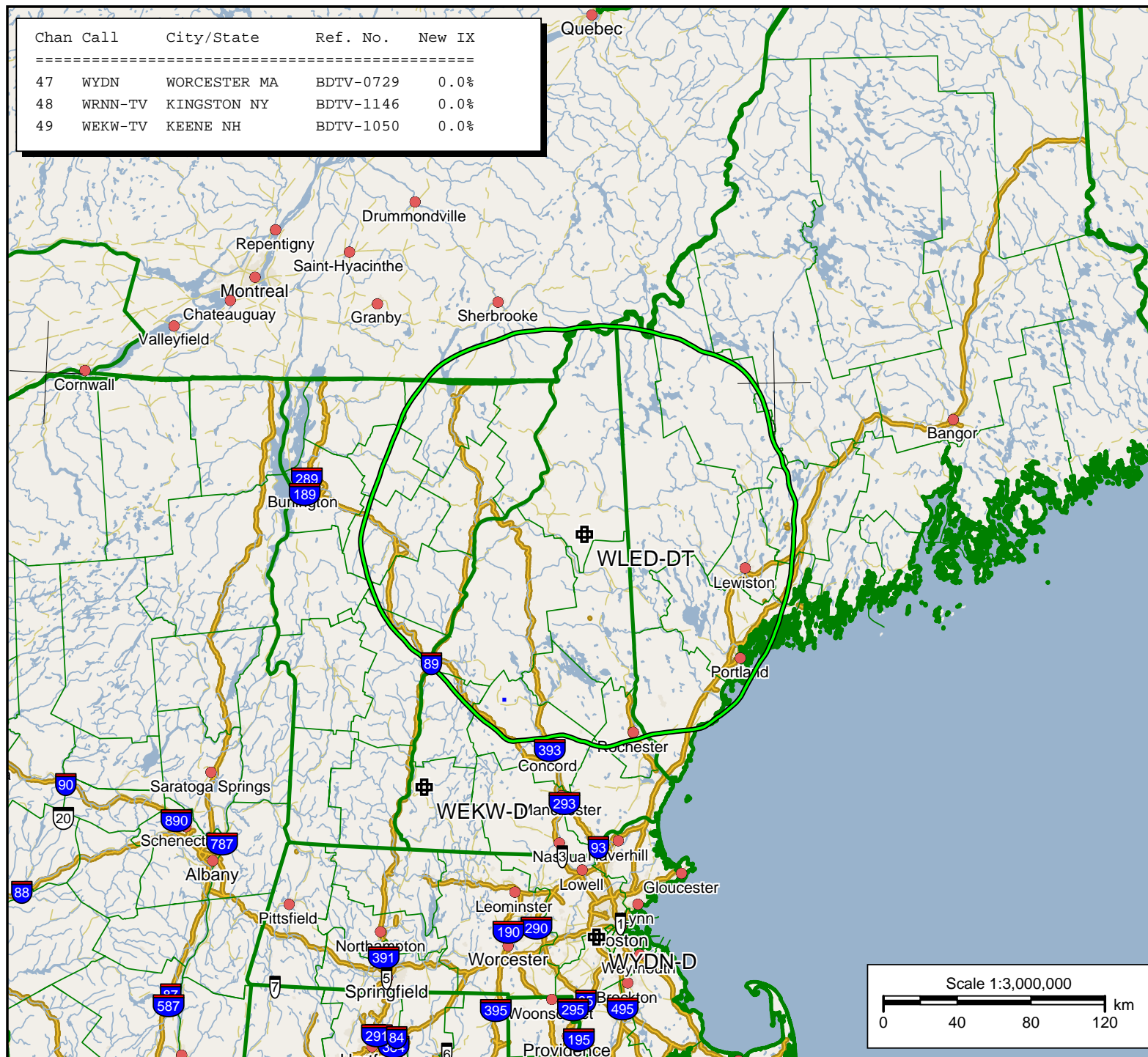
Receiver Ht AG: 10.0 m

Receiver Gain: 0 dB

Time Variability: 10.0%

Sit. Variability: 50.0%

ITM Mode: Broadcast



Scale 1:3,000,000

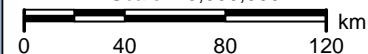
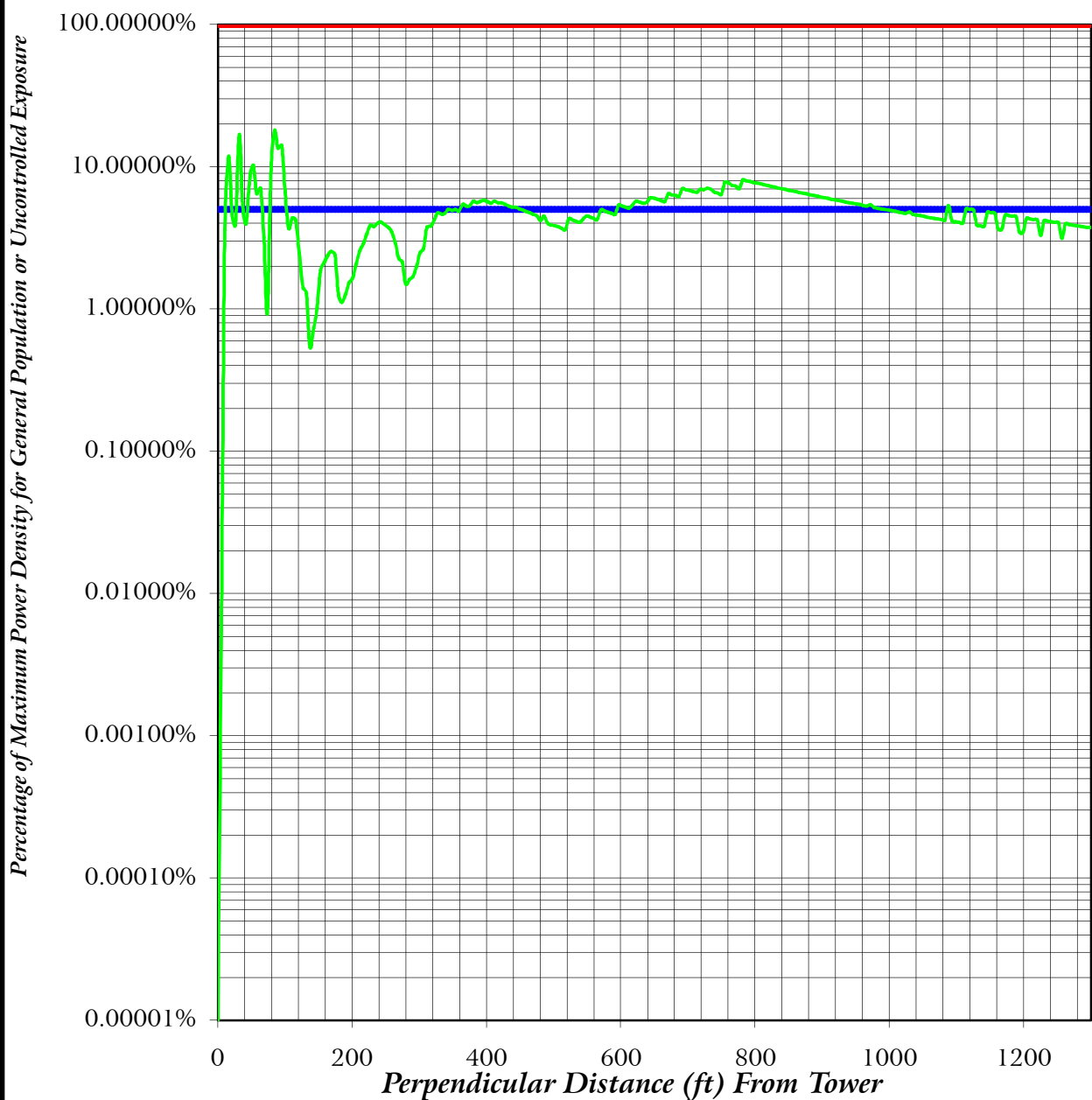


Exhibit E6



# FAR FIELD EXPOSURE TO RF EMISSIONS



- Maximum Allowable General Population or Uncontrolled Exposure
- 5 % of Maximum General Population or Uncontrolled Exposure
- Percentage of Maximum General Population or Uncontrolled Exposure

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EXHIBIT E7A



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**ENGINEERING REPORT**  
**ON**  
**RADIOFREQUENCY EXPOSURE LEVELS**  
**WHOM(FM)**  
**MAIN AND AUXILIARY ANTENNAS**  
**MOUNT WASHINGTON, NH**

**August 2006**



## **PURPOSE AND SCOPE**

The measurements described in this report were conducted to determine if the operation of the WHOM(FM) transmitter facility complies with Federal Guidelines regarding human exposure to Non-ionizing Radio Frequency Radiation.

## **SITE DESCRIPTION**

The summit of Mount Washington is a long established communication site, home to numerous non-broadcast communications facilities (government, business and private microwave) as well as the main and auxiliary antennas for FM broadcast stations WHOM(FM) and WPKQ(FM). The FM facilities operating parameters are:

### **WHOM(FM) Main Facility**

F.C.C. File Number	BMLH-20040301ABK
ERP	48.0 kW
Antenna C/R	14 meters AGL

### **WHOM(FM) Auxiliary Facility**

F.C.C. File Number	BXLH-20051107AFN
ERP	20.5 kW
Antenna C/R	23 meters AGL

### **WPKQ(FM) Main Facility**

F.C.C. File Number	BLH-20000622AEM
ERP	21.5 kW
Antenna C/R	32 meters AGL

### **WPKQ(FM) Auxiliary Facility**

F.C.C. File Number	BLH-19970717KD
ERP	4.8 kW
Antenna C/R	11 meters AGL

The summit is also a popular tourist attraction and is visited, during the summer months, by up to hundreds of tourists per day. A permanently occupied weather observatory also is located on the summit.



## **F.C.C. LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE**

The Federal Communications Commission has adopted exposure guidelines (contained in OET Bulletin 65 Edition 97-01) based upon the standards put forth by the American National Standards Institute ("ANSI") in their document ANSI/IEEE C95.1-1992. ANSI establishes two tiers of recommended limits, one for the general population and another for occupational exposure. General population limits apply in uncontrolled areas and occupational limits apply in controlled areas. Both limits are frequency dependent and are based upon time averaging. The limits are:

### **(A) Limits for Occupational/Controlled Exposure**

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time (minutes)
0.3-3.0	614	1.63	100	6
3.0-30	1842/f	4.89/f	900/f <sup>2</sup>	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6

f = frequency in MHz

### **(B) Limits for General Population/Uncontrolled Exposure**

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time (minutes)
0.3-3.0	614	1.63	100	30
3.0-30	824/f	2.19/f	180/f <sup>2</sup>	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz



NOTE 1: *Occupational/controlled* limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations where an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2: *General population/uncontrolled* exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

## **PROCEDURE**

Measurements of the radio frequency fields atop Mount Washington were conducted by the undersigned on August 9, 2006 while all co-located transmitting equipment were operating at normal levels. The subject FM facilities have four modes of operation:

1. WHOM(FM) main facility and WPKQ(FM) main facility
2. WHOM(FM) main facility and WPKQ(FM) auxiliary facility
3. WHOM(FM) auxiliary facility and WPKQ(FM) main facility
4. WHOM(FM) auxiliary facility and WPKQ auxiliary facility.

Measurements in all four modes were made using a Holaday Instruments HI-3001 Field Intensity Meter. This instrument has a flat frequency response over the frequency band of interest and presents a measurement of field strength in  $V^2/m^2$  for the sum of the entire spectrum. The minimum field necessary to cause a deflection of the instrument meter is  $1 V^2/m^2$ . This minimum field is equivalent to  $0.00027 mW/cm^2$  or 0.135% of general population exposure limit of  $0.200 mW/cm^2$  at the frequencies of interest.



## MEASUREMENT RESULTS

### MODE 1 – WHOM(FM) MAIN and WPKQ MAIN

<u>Measurement Location</u>	<u>Field (<math>V^2/m^2</math>)</u>	<u>% of Limit*</u>
Inside WHOM(FM) transmitter building	<10	<2%
Platform of WHOM transmitter building	20-150	<20%
Area between WHOM(FM) auxiliary tower and Abandoned TV tower	20-50	<7%
In and around entrance to Stage Office	100-200	<27%
At entrance to old power building	400-500	<67%
In parking area in front of Yankee Building	<100	<14%
In Yankee Building (including WPKQ(M) Transmitter room	20-50	<7%
Interior of Tiptop House	<50	<7%
On steps and platform to Tiptop House	<150	<20%
50' east of Stage Office	100-200	<27%
In front of microwave dish rack	200-500	<67%
Vicinity of base of WPKQ(FM) tower	10-35	<5%
Observation Deck of Observatory	20-50	<7%
In Stage parking area	50-100	<14%
In open area between Stage Office and Tip Top House	10-100	<14%
At entrance walkway to Observatory	20-100	<14%
Around base of WHOM main antenna tower	200-700	<93% <sup>1/</sup>
At base of microwave antenna frame near WHOM(FM) Main antenna tower	1000-1500	132-200% <sup>2/</sup>

\* % of MPE for General population/uncontrolled exposure

<sup>1/</sup> This area is inside fence preventing access to general public. The maximum level is <19% of Occupational/Controlled limit.

<sup>2/</sup> This area is inside fence preventing access to general public. The maximum level is <40% of Occupational/Controlled limit.



## MODE 2 – WHOM(FM) MAIN and WPKQ AUXILIARY

<b>Measurement Location</b>	<b>Field (<math>V^2/m^2</math>)</b>	<b>% of Limit*</b>
Inside WHOM(FM) transmitter building	<10	<2%
Platform of WHOM transmitter building	20-100	<20%
Area between WHOM(FM) auxiliary tower and Abandoned TV tower	50-200	<27%
In and around entrance to Stage Office	150-250	<34%
At entrance to old power building	400-500	<67%
In parking area in front of Yankee Building	100-150	<20%
In Yankee Building (including WPKQ(M) Transmitter room	20-80	<11%
Interior of Tiptop House	20-60	<8%
On steps and platform to Tiptop House	50-200	<27%
50' east of Stage Office	100-200	<27%
In front of microwave dish rack	200-500	<67%
Vicinity of base of WPKQ(FM) tower	100-250	<34%
Observation Deck of Observatory	20-250	<34%
In Stage parking area	50-150	<20%
In open area between Stage Office and Tip Top House	20-150	<20%
At entrance walkway to Observatory	20-150	<20%
Around base of WHOM main antenna tower	200-700	<93% <sup>1/</sup>
At base of microwave antenna frame near WHOM(FM) Main antenna tower	1000-1500	132-200% <sup>2/</sup>

\* % of MPE for General population/uncontrolled exposure

<sup>1/</sup> This area is inside fence preventing access to general public. The maximum level is <19% of Occupational/Controlled limit.

<sup>2/</sup> This area is inside fence preventing access to general public. The maximum level is <40% of Occupational/Controlled limit.



### MODE 3 – WHOM(FM) AUXILIARY and WPKQ MAIN

<b>Measurement Location</b>	<b>Field (<math>V^2/m^2</math>)</b>	<b>% of Limit*</b>
Inside WHOM(FM) transmitter building	10-20	<3%
Platform of WHOM transmitter building	200-500	<67%
Area between WHOM(FM) auxiliary tower and Abandoned TV tower	100-500	<67%
In and around entrance to Stage Office	200-350	<47%
At entrance to old power building	100-200	<27%
In parking area in front of Yankee Building	40-100	<14%
In Yankee Building (including WPKQ(M) Transmitter room	20-40	<6%
Interior of Tiptop House	20-80	<11%
On steps and platform to Tiptop House	300-500	<67%
50' east of Stage Office	50-200	<27%
In front of microwave dish rack	50-150	<20%
Vicinity of base of WPKQ(FM) tower	200-400	<54%
Observation Deck of Observatory	50-150	<20%
In Stage parking area	300-450	<60%
In open area between Stage Office and Tip Top House	200-300	<40%
At entrance walkway to Observatory	50-200	<27%
Around base of WHOM main antenna tower	50-200	<27%
At base of microwave antenna frame near WHOM(FM) Main antenna tower	50-250	<34%

\* % of MPE for General population/uncontrolled exposure



# MODE 4 – WHOM(FM) AUXILIARY and WPKQ AUXILIARY

Measurement Location	Field ( $V^2/m^2$ )	% of Limit*
Inside WHOM(FM) transmitter building	10-20	<3%
Platform of WHOM transmitter building	200-500	<67%
Area between WHOM(FM) auxiliary tower and Abandoned TV tower	100-600	<80%
In and around entrance to Stage Office	200-350	<47%
At entrance to old power building	100-200	<27%
In parking area in front of Yankee Building	100-300	<40%
In Yankee Building (including WPKQ(M) Transmitter room	20-60	<8%
Interior of Tiptop House	50-150	<20%
On steps and platform to Tiptop House	300-600	<80%
50' east of Stage Office	50-250	<34%
In front of microwave dish rack	50-250	<34%
Vicinity of base of WPKQ(FM) tower	250-400	<54%
Observation Deck of Observatory	50-200	<27%
In Stage parking area	300-400	<54%
In open area between Stage Office and Tip Top House	200-350	<47%
At entrance walkway to Observatory	50-200	<27%
Around base of WHOM main antenna tower	50-200	<27%
At base of microwave antenna frame near WHOM(FM) Main antenna tower	50-300	<40%

\* % of MPE for General population/uncontrolled exposure



## **CONCLUSIONS**

### **WHOM(FM) Main Antenna**

The data in this study shows that at all measurement locations, except one small location near the WHOM(FM) main antenna, the RF field density generated by the operation of the WHOM(FM) main facility is below the General Public/Uncontrolled MPE. The single location above the MPE is fenced to prevent unauthorized access. The station Chief Engineer, Robert Perry, who assisted in these measurements, is replacing the warning sign near the area. The location is not near any public use trail or tourist attraction. The location of interest is less than ten square feet in area. The RF field density at this location does not exceed the Occupational/Controlled MPE.

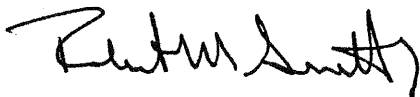
Provided the single location (at the microwave antenna frame near the base of the WHOM(FM) main antenna) remains fenced and appropriate warning signs are in place, the operation of the WHOM(FM) main facility is in compliance with the F.C.C. Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields.

### **WHOM(FM) Auxiliary Antenna**

At all measurement locations the RF field density generated by the operation of the WHOM(FM) auxiliary facility is below the General Public/Uncontrolled MPE. The operation of the WHOM(FM) auxiliary facility is in compliance with the F.C.C. Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields.

## **CERTIFICATION**

I, Robert M. Smith Jr., of Port St. Lucie, Florida, do hereby certify that I personally conducted the measurements and calculations covered in this Report. All of the data and calculations are true and correct to the best of my knowledge and belief.



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Robert M. Smith Jr.





METHODOLOGY AND EXPLANATION OF  
ENVIRONMENTAL IMPACT / RADIO FREQUENCY RADIATION  
HAZARD ANALYSIS

A theoretical analysis has been conducted of the human exposure to radio frequency radiation ("RFR") using the calculation methodology described in *OET Bulletin 65, Edition 97-01*. The RFR analysis is conducted pursuant to the following methodology:

Terrain<sup>1</sup> extraction is compiled from the proposed tower site to radial lengths of 0.25 miles in 0.001 mile increments for 360 radials. The power density is calculated for each terrain point at 6 feet above ground level using the elevation and azimuth pattern of the proposed broadcast antenna. The power density calculations are conducted using the lower edge of the proposed channel frequency. To account for ground reflections, a coefficient of 1.6 was included in the calculation.

The resulting cylindrical polar analysis is then summarized into a coordinate plane graph using the following methodology:

Starting from the origin the maximum calculated RFR value is determined among the 360 degree radials for each 0.001 mile increment, the value is then converted into a percentage of the maximum allowable general population or uncontrolled exposure and plotted as a function of perpendicular distance from the tower.

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<sup>1</sup> Terrain extraction is based upon a 3 arc second point spacing terrain database.