

ENGINEERING REPORT

Minor Modification
Construction Permit Application
for FM Station:

WTKC(FM) – Findlay, OH
Channel 209A (89.7 MHz)
BLED-20110727ADO

November 2021

MUNN-REESE

Broadcast Engineering Consultants
Coldwater, MI 49036

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DISCUSSION OF REPORT

This firm was retained to prepare the required engineering report in support of a minor modification Construction Permit Application for Non-Commercial FM station WTKC(FM) Findlay, OH – File No. BLED-20110727ADO. Currently WTKC(FM) is licensed to operate with 0.2 kW with a center of radiation at 268 meters AMSL utilizing a non-directional antenna. This minor change application requests 0.24 kW at 252 meters AMSL utilizing a non-directional antenna from a different site. The facility will continue to serve the community of Findlay, OH as shown in **Exhibit 1.0**.

The proposed site for the Class A operation meets all the contour protection requirements towards other stations in the allocation. A tabulation of the proposed protections to each of the other relevant stations is found in **Exhibit 2.0**.

The transmitter site is located within 320 km of the common border between the United States and Canada. Full protection is afforded all international facilities as noted in **Exhibit 2.0**. The 34 dBu interfering contour of the proposed WUPJ does not cross onto Canadian soil. The transmitter site proposed in this application is not located within the affected radius of any Channel 6 television station, therefore no further TV-6 showings are believed necessary.

The proposed service contours have been calculated in accordance with the Rules, and the data obtained has been tabulated and plotted in this report. The plotted contours are found as **Exhibit 1.0** of this report. This exhibit shows the overall service that is provided by the 1.0 mV/m contour of the facility. The tabulation of the distances to the respective contours shown in this discussion is based on the use of the standard eight cardinal bearings, which were also used for the computation of the HAAT.

The antenna will be mounted above the roof of a building. The applicant has completed an environmental assessment showing that there would be no Adverse Effect to historic resources because of this proposed project. Public notice has also been given. The complete EA will be supplied upon request.

DISCUSSION OF REPORT (continued)

The potential for human exposure to non-ionizing radiofrequency radiation at the proposed transmitter site has been evaluated. **Exhibit 3.0** provides the details of the study that was made to demonstrate compliance. The facility is properly marked with signs, and entry is restricted by means of fencing with locked doors and/or gates. Any other means as may be required to protect employees and the general public will be employed.

In the event work would be required in proximity to the antenna such that the person or persons working in the area would be potentially exposed to fields in excess of the guidelines set forth in OET Bulletin No. 65 (Edition 97-01), the transmitter power will be reduced or the station will cease operation during the critical period.

DISTANCES TO CONTOURS: The table below shows the distances to the 1.0 mV/m contour from the proposed facility using an ERP of 30 kW at an HAAT of 269 meters. These distances have been calculated based on the FCC F(50-50) curves.

N. Lat. = 460805.0 W. Lng. = 865656.0 HAAT and Distance to Contour, FCC, FM 2-10 Mi, 51 pts Method - NGDC 30 SEC					
Azi.	AV EL	HAAT	ERP kW	dBk	60-F5
000	273.7	250.3	30.0000	14.77	56.74
045	246.1	277.9	14.8263	11.71	52.21
090	239.6	284.4	1.9051	2.80	35.35
135	223.3	300.7	0.9505	-0.22	30.89
180	223.9	300.1	4.7760	6.79	43.55
225	259.3	264.7	30.0000	14.77	57.80
270	284.1	239.9	30.0000	14.77	55.97
315	286.0	238.0	30.0000	14.77	55.83
Ave El= 254.51 M HAAT= 269.49 M AMSL= 524.0					

Exhibit 1.0 - WTKC(FM) Present and Proposed Coverage Contours

WTKC
 BLED20110727ADO
 Latitude: 41-03-10.91 N
 Longitude: 083-39-12.94 W
 ERP: 0.20 kW
 Channel: 209
 Frequency: 89.7 MHz
 AMSL Height: 268.0 m
 Elevation: 238.0 m
 Horiz. Pattern: Omni
 Vert. Pattern: No
 Prop Model: None

WTKC.P
 Proposed Operation
 Latitude: 41-02-57 N
 Longitude: 083-38-58 W
 ERP: 0.24 kW
 Channel: 209
 Frequency: 89.7 MHz
 AMSL Height: 252.19 m
 Elevation: 237.19 m
 Horiz. Pattern: Omni
 Vert. Pattern: No
 Prop Model: None

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■ WTKC (209)
■ WTKC.P (209)

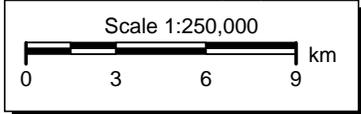
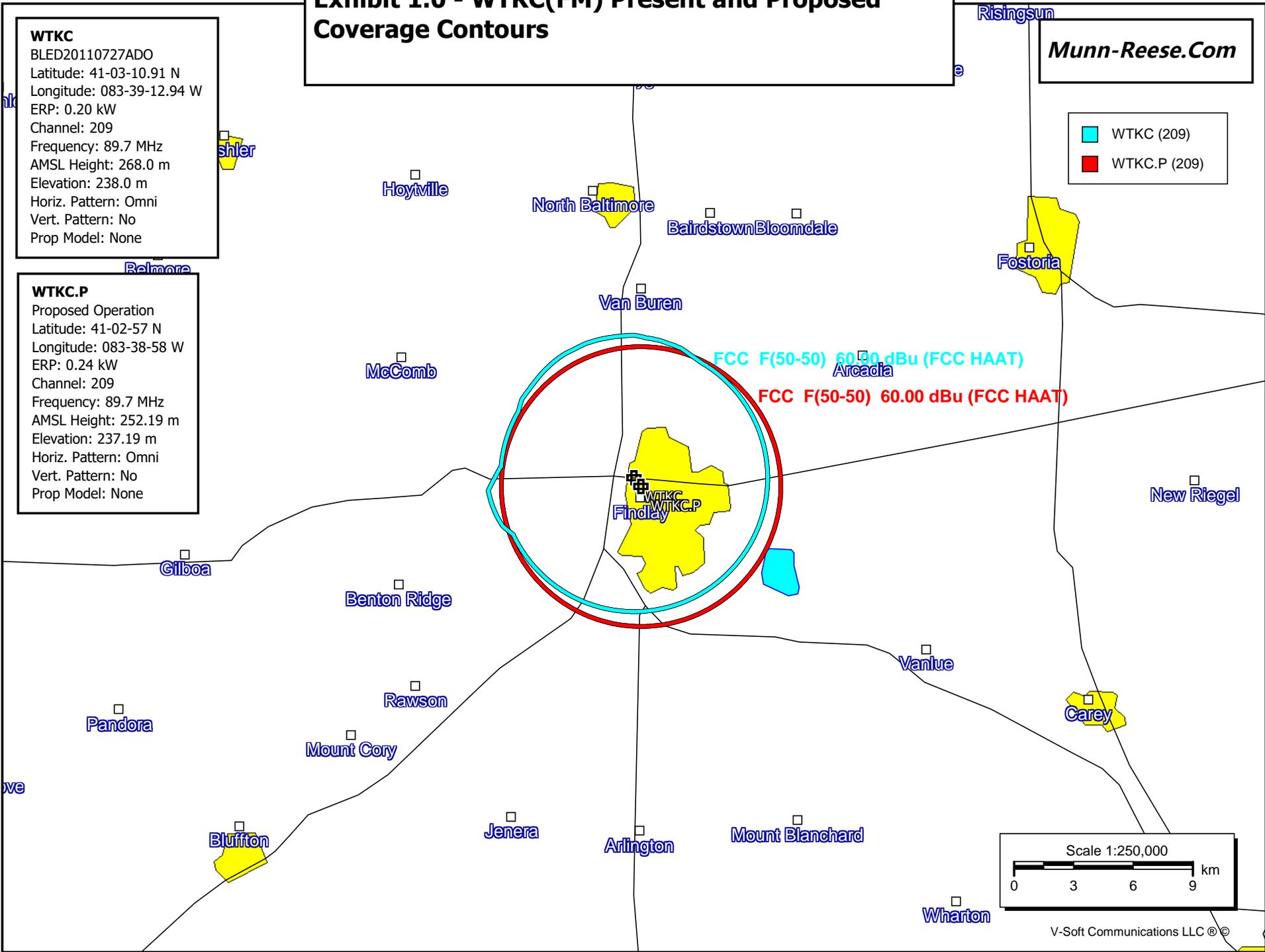


Exhibit 2.0 - Proposed Allocation
 Faith Educational Media, Inc.

REFERENCE CH# 209A - 89.7 MHz, Pwr= 0.24 kw, HAAT= 9.8 M, COR= 252 M
 41 02 57.00 N. Average Protected F(50-50)= 7.02 km
 83 38 58.00 W. Omni-directional

DISPLAY DATES
 DATA 11-15-21
 SEARCH 11-17-21

CH CITY	CALL	TYPE STATE	ANT AZI <--	DIST FILE #	LAT LNG	PWR(kw) HAAT(M)	INT(km) COR(M)	PRO(km) LICENSEE	*IN* (Overlap in km)	*OUT*
209A Findlay	WTKC	LIC _CN OH	321.8 141.8	0.55 BLED20110727ADO	41 03 11.09 83 39 12.69	0.200 26	268	---Reference---		
209B Columbus	WOSU-FM	LIC DCN OH	154.9 335.3	126.37 BLED20100202ABD	40 01 02.20 83 01 10.70	40.000 168	119.3 418	45.0	0.1	57.8
209A Bowling Green	WNOC	LIC DCN OH	4.7 184.7	42.15 BLED20100824AAT	41 25 39.20 83 36 29.79	5.300 88	34.7 289	10.3	0.4	8.3
211B Upper Sandusky	WXML	LIC _CN OH	108.6 288.9	46.54 BLED20100624ALI	40 54 53.21 83 07 31.70	15.000 158	4.6 425	44.8	34.9	0.6
263B Findlay	WKXA-FM<	LIC _CN OH	163.0 343.0	15.38 BLH19860103KB	40 55 00.10 83 35 44.70	20.000 134	0.3 393	6.6	14.5R	0.9M
209A Delphos	762656	APP DCN OH	254.8 74.4	56.12 0000166351	40 54 54.59 84 17 33.29	1.200 73	45.8 297	13.1	3.3	19.5
208B1 Archbold	WBCY	LIC DCN OH	312.6 132.1	71.66 BLED20051205AAM	41 28 59.20 84 16 57.80	20.000 96	53.5 317	34.7	11.2	27.0
207D Hamler	W207CD	LIC _VN OH	294.4 114.2	23.68 BLFT20110329AAD	41 08 12.20 83 54 23.79	0.013 131	0.3 352	6.7	16.4	15.9
209A Van Wert	766395	APP DCN OH	255.8 75.2	78.60 0000167687	40 52 19.80 84 33 13.30	1.700 42	53.1 279	14.2	18.5	40.9
207A Sycamore	WXMW	LIC _CN OH	108.6 288.9	46.54 BLED20100902AEL	40 54 53.21 83 07 31.70	0.390 158	1.4 425	19.7	38.1	25.8
06+-- Toledo	WDMY-LP/W<	CP _CY OH	17.9 198.1	72.89 0000099460	41 40 22.00 83 22 47.00	3.000	4.5 421	32.3	36.9R	36.0M
210C1 Windsor	CBE-FM	OP _HN ON	25.0 205.5	135.65 3931	42 09 11.99 82 57 11.00	100.000 164	90.1 350	73.9	38.5	47.7
207A Lima	WYSM	LIC _CN OH	221.6 41.3	58.56 BLED20010411AAW	40 39 15.19 84 06 35.81	3.000 67	1.8 343	18.1	49.7	39.4
209B Kent	WKSU	LIC _CN OH	88.1 269.4	169.43 BLED20110210ACA	41 04 58.20 81 38 01.39	12.000 277	120.5 596	49.4	42.0	96.5
207A Maumee	WYSZ	LIC DCN OH	358.4 178.4	64.00 BLED20171002ADR	41 37 31.19 83 40 15.81	2.700 74	1.9 263	19.8	55.0	43.1
210B Greenville	WDPG	LIC DCN OH	219.3 38.6	128.99 BLED19930920KA	40 08 49.10 84 36 35.81	50.000 123	75.1 436	49.5	46.9	69.5
206D Fremont	W206BX	LIC DCN OH	52.9 233.3	58.72 BLFT20141204AAF	41 21 58.19 83 05 19.70	0.055	0.5 263	6.9	51.2	50.7
208A Sandusky	WVMS	LIC _CN OH	58.0 238.6	83.06 BLED20150910AAR	41 26 29.10 82 48 19.59	5.500 30	23.7 214	15.9	52.4	57.1
210B1 Edon	WRR0	LIC DCN OH	301.1 120.3	109.16 BLED20180402ACR	41 32 58.50 84 46 17.81	15.000 96	49.6 370	32.2	52.5	66.9
212A Toledo	WOTL	LIC DCN OH	3.1 183.1	66.44 BMLLED20130530AMK	41 38 48.20 83 36 21.80	0.700 115	0.5 299	8.7	59.0	56.6
06--- Toledo	WDMY-LD<	LI _CN OH	338.4 158.2	83.22 0000163484	41 44 40.99 84 01 06.00	1.500	4.6 300	15.5	20.1R	63.2M
208A Lexington	WFOT	LIC _CN OH	112.1 292.8	94.13 BMLLED20130912ABZ	40 43 36.20 82 36 58.61	0.360 93	22.4 480	14.9	64.7	69.2
206A Delaware	WJJE	LIC _VN OH	134.2 314.8	102.94 BMLLED20051017AAY	40 24 02.20 82 46 42.61	6.000 100	3.0 450	31.5	92.9	70.3
206B Fort Wayne	WBOI	LIC DCN IN	273.2 92.2	128.64 BLED19940406KA	41 06 13.10 85 10 43.80	34.000 184	6.1 429	53.3	115.6	74.3
212B Fort Wayne	WBCL	LIC _CN IN	273.2 92.2	130.09 BLED20040528AHQ	41 06 13.21 85 11 45.90	26.000 211	6.0 457	53.1	117.1	75.9

CH CITY	CALL	TYPE STATE	ANT STATE	AZI <--	DIST FILE #	LAT LNG	PWR(kw) HAAT(M)	INT(km) COR(M)	PRO(km) LICENSEE	*IN* (Overlap	*OUT* in km)
206A Lorain	WNZN	LIC _CN OH		73.6 254.4	105.35 BLED19920319KA	41 18 34.10 82 26 30.60	2.200 114	2.2 344	24.8 Pace Foundation	96.1	79.5
208A Carleton	768244	APP DCN MI		8.0 188.1	99.71 0000167789	41 56 17.99 83 28 54.99	1.570 61	10.8 248	7.5 Smile FM	81.9	82.2
262D Celina	W262DC	LIC _CN OH		233.2 52.6	91.65 0000125231	40 33 10.50 84 31 02.10	0.250	0.3 393	6.6 Hayco Broadcasting, Inc.	9.5R	82.2M
209D Fort Wayne	W209AW	LIC _VN IN		271.7 90.8	116.77 BLFT20021217AAZ	41 04 21.20 85 02 18.89	0.080 46	23.2 284	6.9 Pensacola Christian Colleg	86.6	86.4
209B1 Burton	WTAC	CP DVN MI		358.3 178.3	188.83 BPED20190812AAU	42 44 56.10 83 42 58.79	15.000 110	93.6 401	31.3 Smile FM	88.2	134.1
209B1 Burton	WTAC	LIC DVN MI		358.3 178.3	188.83 BLED20130809AAP	42 44 56.10 83 42 58.79	15.000 110	93.6 401	31.3 Smile FM	88.2	134.1
210D Ashland	W210BG	LIC DCN OH		101.6 282.5	111.23 BLFT20170728AER	40 50 26.20 82 21 25.59	0.080	11.8 404	8.4 Bible Broadcasting Network	92.4	92.8
206B1 Ypsilanti	WEMU	LIC DCN MI		0.8 180.8	134.84 BLED19920109KA	42 15 48.11 83 37 33.79	15.500 88	3.8 331	36.9 Eastern Michigan Universit	124.1	96.8
208A Huron Township	WDTP	LIC DCN MI		16.5 196.8	129.01 BLED20110526AJF	42 09 44.10 83 12 19.71	0.700 95	24.4 273	16.4 Smile FM	97.6	102.6
06Z-- Cleveland	WTCL-LP	STA _HN OH		76.5 257.8	167.06 0000068414	41 22 58.00 81 42 06.00	0.003	4.5 506	5.7	10.2R	156.8M

Terrain database is NED 03 SEC , R= 73.215 qualifying spacings or FCC minimum Spacings in KM, M= Margin in KM
Contour distances are on direct line to and from reference station. Reference zone= - Zone 1, Co to 3rd adjacent.
All separation margins (if shown) include rounding. Call signs with strikeout need not be protected.
Ant Column: (D= DA Standard, Z= DA 73.215, N= Not DA 73.215, _= Omni), Polarization (C,H,V,E), Beamtilt(Y,N,X)
"*"affixed to 'IN' or 'OUT' values = site inside restricted contour.
< = Station meets FCC minimum distance spacing for its class.
< = Contour Overlap
Reference station has protected zone issue: Canada

Exhibit 3.0 Compliance with Radiofrequency Radiation Guidelines

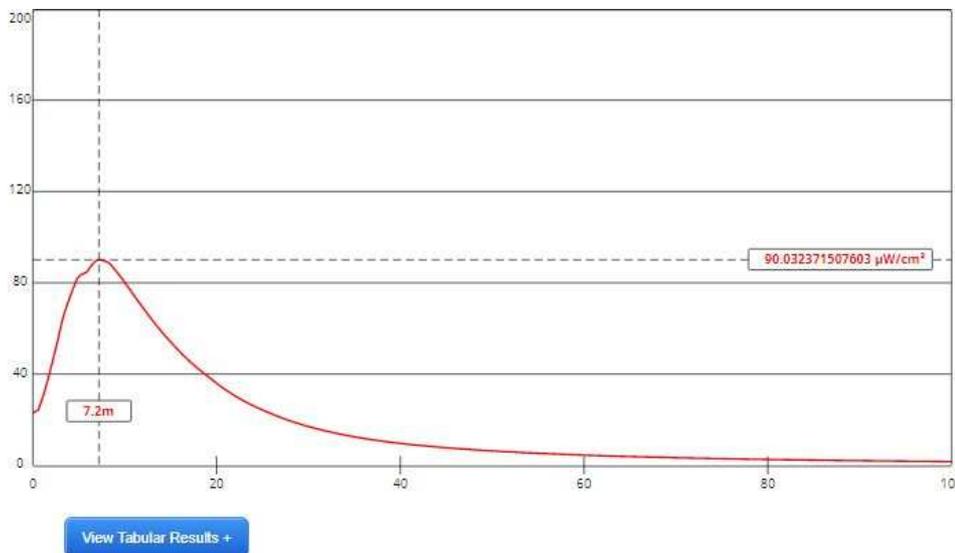
The RF Compliance Study has been evaluated for human exposure to non-ionizing radiofrequency radiation at the transmitter site. The site is intended to house multiple transmitters. The potential for human exposure to non-ionizing radiofrequency radiation at the proposed transmitter site has therefore been evaluated with regards to the §1.1307(b)(3), five percent (5%) contribution rule, for multiple transmitter sites.

The proposed operation will broadcast from an antenna COR mounted 15 meters above ground level (AGL) atop a pole on building rooftop. The minimum distance between the antenna and any people below the antenna is at least 9 meters. The facility will operate with a one bay antenna employing EPA Type 2 elements as defined by *FM Model - Appendix B* issued March 31, 2016¹. This facility will not operate with HD/IBOC facilities at this time.

To evaluate the total exposure to non-ionizing radio-frequency radiation with regards to the single source contribution rules, the individual contribution may be expressed directly in $\mu\text{W}/\text{cm}^2$ units relative to the maximum permissible uncontrolled environment limit of $200 \mu\text{W}/\text{cm}^2$. If the resulting contribution is less than or equal to $200 \mu\text{W}/\text{cm}^2$, the exposure is concluded to be within the guidelines of OET Bulletin No. 65 (Edition 97-01) and §1.1310 for the more restrictive uncontrolled limit. Protection of the uncontrolled limit ($200 \mu\text{W}/\text{cm}^2$) implies protection of the controlled limit ($1000 \mu\text{W}/\text{cm}^2$).

Inspection of the graph below shows the maximum contribution for the uncontrolled environment to be less than $200 \mu\text{W}/\text{cm}^2$ as set forth by §1.1310. Therefore, the facility is in compliance with FCC guidelines. In addition to the protection afforded by the proposed antenna height above ground, the facility is or will be properly marked with signs, and/or entry to the facility will be restricted by means of fencing with locked doors and/or gates if required. Any other means that may be required to protect employees and the general public will also be employed.

In the event work is required in proximity to the antenna(s) such that the person or persons working in the area will be potentially exposed to fields in excess of the current guidelines, an agreement signed by all broadcast parties at the site will be in effect for the offending transmitter(s) to reduce power, or cease operation during the critical period.



¹ The current *FM Model* web-based software application employs the standards as detailed in OET Bulletin No. 65 (Edition 97-01). FM radiofrequency radiation levels have been predicted using both the array pattern, the calculations of which are based on the number of bays in the antenna and wavelength spacing between the bays, and the element pattern. The element pattern has been determined by using measured element data prepared by the EPA and published in "An Engineering Assessment of the Potential Impact of Federal Radiation Protection Guidance on the AM, FM and TV Services," by Paul C. Gailey and Richard Tell - April 1985, U.S. Environmental Protection Agency. The results of the evaluation for the FM station have been shown at the end of this RF compliance discussion. To ensure complete protection, the maximum FM contribution has been assumed without regard to any restricted access fencing distance.

Channel Selection	Channel 209 (89.7 MHz)		
Antenna Type +	EPA Type 2: Opposed V Dipole		
Height (m)	9	Distance (m)	100
ERP-H (W)	240	ERP-V (W)	240
Num of Elements	1	Element Spacing (λ)	1
Num of Points	500	Apply	

