

*du Treil, Lundin & Rackley, Inc.*

Consulting Engineers

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TECHNICAL EXHIBIT  
APPLICATION FOR MODIFICATION OF  
CONSTRUCTION PERMIT  
AUXILIARY ANTENNA  
TELEVISION STATION WGN-DT  
CHICAGO, ILLINOIS

January 16, 2004

TECHNICAL EXHIBIT  
APPLICATION FOR MODIFICATION OF CONSTRUCTION PERMIT  
AUXILIARY ANTENNA  
TELEVISION STATION WGN-DT  
CHICAGO, ILLINOIS

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Technical Statement

This Technical Statement was prepared on behalf of digital television broadcast station WGN-DT, Chicago, Illinois, in support of an application for modification of construction permit for its auxiliary antenna. WGN-DT is authorized for operation on Channel 19 with a maximum effective radiated power (ERP) of 645 kW and an antenna height above average terrain of 453 m.\* The WGN-DT main transmitting antenna is located on the west antenna stack on the roof the Sears Building in Chicago. The proposed WGN-DT auxiliary antenna will be located on the east stack on the roof of the Sears Building.†

The WGN-DT temporary facility would operate with a maximum ERP of 24.9 dBk (310 kW) using a directional antenna and an antenna HAAT of 478 m. The predicted 41 dBu f(50,90) noise-limited coverage contour of the proposed WGN-DT auxiliary facility is entirely encompassed by the predicted 41 dBu f(50,90) noise-limited coverage of the WGN-DT Channel 19 construction permit facility, as required.

\* See FCC File No. BPCDT-20010504AAC.

† The geographic coordinates (NAD27) of the site are 41°52'44"W / 87°38'08W.

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Proposed Facilities

An RFS, Model PHP-24C transmitting antenna will be employed for the WGN-DT auxiliary operation.<sup>†</sup> The antenna is located 42 m above roof level; 478 m above ground level and 659 m above mean sea level. The proposed facility will operate on Channel 19 with a maximum directional average ERP of 310 kW and an antenna radiation center HAAT of 478 m. The particulars of the proposed operation are summarized in the table below:

Parameter	Proposed
Transmitter power output	10.41 dBk (11.0 kW)
Combiner insertion loss	0.23 dB
Transmission line loss	0.38 dB
Total transmission loss	0.61 dB
Antenna input power	9.8 dBk
Antenna gain	15.1 dB
Maximum effective radiated power	24.9 dBk (310 kW)

Figure 2 is a polar graph of the azimuthal plane relative field pattern for the proposed transmitting antenna.<sup>‡</sup> The vertical plane elevation pattern of the proposed antenna at Channel 19 is included herein as an Appendix.

There are no AM broadcast stations located within 3.2 km of the proposed transmitter site. There are numerous broadcast and non-broadcast facilities located in proximity to the proposed facility. No adverse electromagnetic impact is expected with respect to these facilities. However, the applicant recognizes its

<sup>†</sup> The antenna will be shared amongst the several television tenants on the Sears Building.

<sup>‡</sup> Boresight of the transmitting antenna is located at 235° True.

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responsibility to correct objectionable electromagnetic interference problems that result from its proposed operation.

The proposed transmitter is located more than 371 km from the closest point on the border with Canada. The closest FCC Monitoring station is located at Allegan, Michigan at a distance of 160 km at a bearing of 59° True.

#### Tower Registration

The east stack antenna structure has been registered with the FCC. The antenna structure registration number is 1032960. The structure is located at 233 South Wacker Drive, Chicago, Illinois. There will be no change in the overall structure height as a result of the instant proposal.

#### Predicted Coverage Contours

The predicted 41 dBu f(50,90) noise-limited (NL) coverage contour for the proposed facility was calculated in accordance the FCC Rules. The 3-16 km terrain data were obtained through use of the U.S.G.S. 3-second computer database. The predicted NL coverage contour is projected on a map included herein as Figure 1.

#### Environmental Considerations

With respect to the potential for human exposure to radio frequency (RF) radiation, calculations prepared in accordance with FCC Bulletin OET-65 (Edition 97-01) indicate that the proposal will not result in human exposure to RF radiation at ground level in excess of FCC standards. Power density calculations were conducted at

2-m above ground\*\* based on the following conservative assumptions, with the following results:

Call Sign	Channel	Peak Visual ERP or Average ERP (kW)	Aural ERP (kW)	Relative Field Factor <sup>††</sup>	FCC Limit <sup>††</sup> (mW/cm <sup>2</sup> )	Percentage of Limit
WGN-DT	19	310	--	0.11	0.335	0.17%

As indicated above, the exposure to RF radiation at 2-m above ground level will not exceed 0.17% of the FCC limit for general population / uncontrolled exposure.

With respect to the rooftop, the management of the Sears Building strictly controls access to the roof; and it would be defined as a controlled environment for the purposes of RF exposure evaluation. Power density calculations were conducted at 2-m above roof level<sup>§§</sup> based on the following conservative assumptions, with the following results:

Call Sign	Channel	Peak Visual ERP or Average ERP (kW)	Aural ERP (kW)	Relative Field Factor <sup>***</sup>	FCC Limit <sup>†††</sup> (mW/cm <sup>2</sup> )	Percentage of Limit
WGN-DT	19	310	--	0.11	1.6767	4.7%

As indicated above, the exposure to RF radiation at 2-m above ground level will not exceed 4.7% of the FCC limit for occupational / controlled exposure.

The strict work rules in place concerning access to the Sears Building roof will continue; and the applicant shall cooperate in implementation of the work rules.

\*\* The radiation center is located 478 m above ground level.  
<sup>††</sup> This is a conservative estimate of the relative field factor in the downward direction.  
<sup>††</sup> for general population/uncontrolled environments  
<sup>§§</sup> The radiation center is located 42 m above the roof level.  
<sup>\*\*\*</sup> This is a conservative estimate of the relative field factor in the downward direction. This is not exceeded for angles greater than 11° below the horizontal. See Appendix.  
<sup>†††</sup> for occupational/controlled environments

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Therefore, the proposal complies with the FCC limits for human exposure to RF radiation and it is categorically excluded from environmental processing.

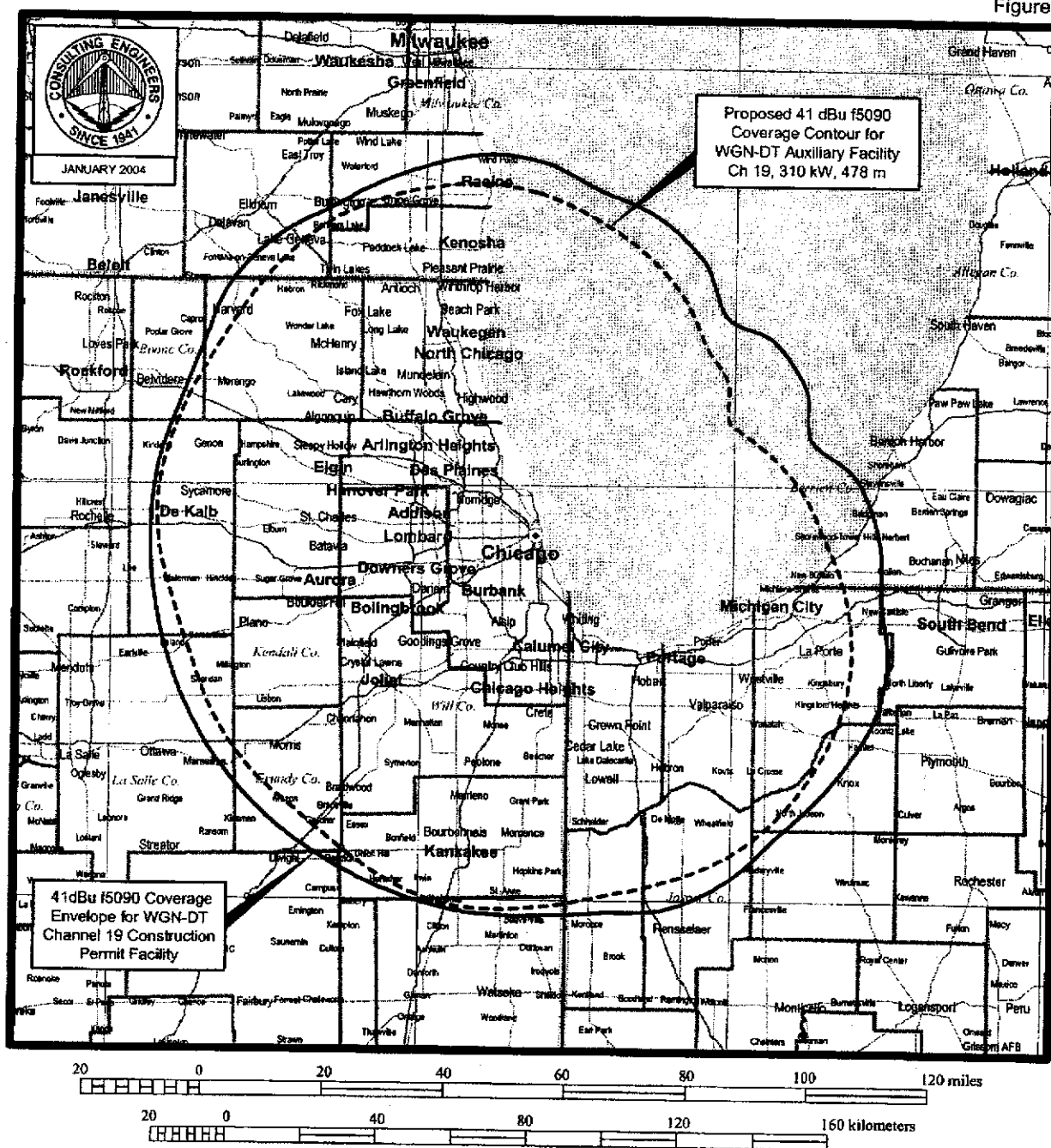
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January 16, 2004

Figure 1



# **PREDICTED 41 dBu f(50,90) NOISE-LIMITED COVERAGE COMPARISON**

AUXILIARY ANTENNA  
TELEVISION STATION WGN-DT  
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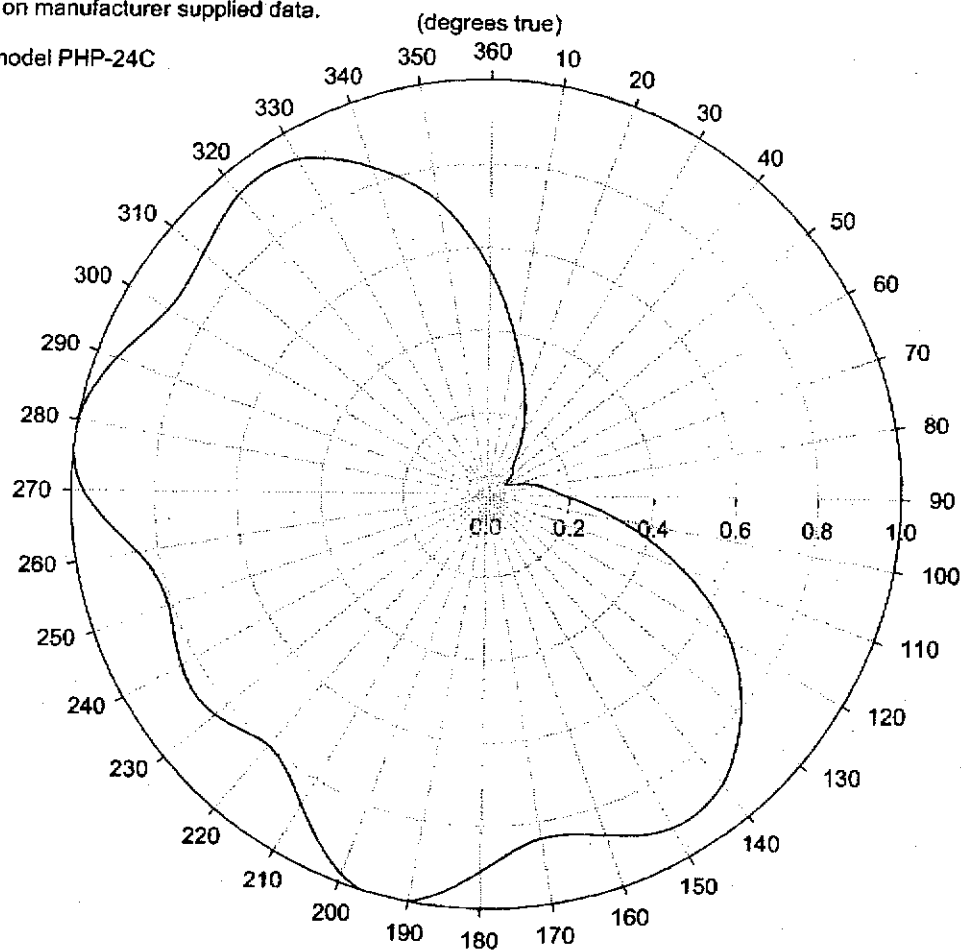
du Treil, Lundin & Rackley, Inc. Sarasota, Florida



Figure 2

Based on manufacturer supplied data.

RFS, model PHP-24C

Tabulation of relative field pattern by azimuth

0	0.55	70	0.08	140	0.90	210	0.90	280	1.00
10	0.38	80	0.13	150	0.92	220	0.92	290	0.95
20	0.26	90	0.19	160	0.87	230	0.87	300	0.89
30	0.17	100	0.32	170	0.84	240	0.84	310	0.90
40	0.10	110	0.50	180	0.91	250	0.91	320	0.94
50	0.08	120	0.68	190	1.00	260	1.00	330	0.93
60	0.05	130	0.81	200	0.98	270	0.98	340	0.84
								350	0.72

**PROPOSED AZIMUTHAL PLANE PATTERN**

AUXILIARY ANTENNA  
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Appendix

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Transmitting Antenna  
Manufacturer's Vertical Plane Pattern

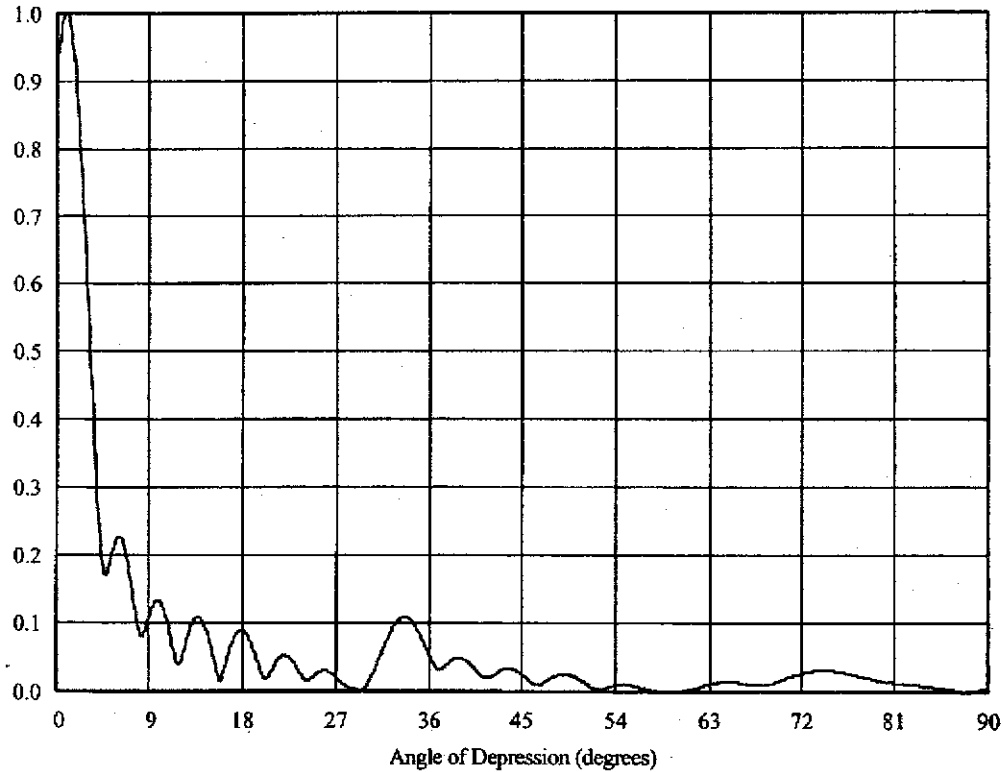
(two pages follow)

# RADIO FREQUENCY SYSTEMS



## PHP24C NORTH EAST STANDBY – WGN CH19

E / Emax



Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-90	0.0000	-60	0.0042	-30	0.0279	0	0.8949	30	0.0127	60	0.0012
-85	0.0215	-55	0.0058	-25	0.0352	5	0.1750	35	0.0850	65	0.0149
-80	0.0518	-50	0.0048	-20	0.0612	10	0.1322	40	0.0403	70	0.0180
-75	0.0328	-45	0.0240	-15	0.0602	15	0.0645	45	0.0256	75	0.0312
-70	0.0283	-40	0.0292	-10	0.0382	20	0.0203	50	0.0224	80	0.0159
-65	0.0138	-35	0.0302	-5	0.2023	25	0.0261	55	0.0109	85	0.0070
										90	0.0060

Vertical Directivity (12.4dBd)  
FCC Data Format  
Date 12-JAN-04

TABULATION OF ELEVATION PATTERN FOR RFS, PHP-24C  
CHANNEL 19

Elevation (degrees below horizontal)	Relative Field	Elevation (degrees below horizontal)	Relative Field	Elevation (degrees below horizontal)	Relative Field
0	0.895	30	0.013	60	0.001
1	1.000	31	0.045	61	0.004
2	0.883	32	0.081	62	0.008
3	0.599	33	0.105	63	0.012
4	0.285	34	0.107	64	0.014
5	0.175	35	0.085	65	0.015
6	0.226	36	0.051	66	0.014
7	0.184	37	0.033	67	0.011
8	0.092	38	0.044	68	0.010
9	0.106	39	0.050	69	0.013
10	0.132	40	0.040	70	0.018
11	0.089	41	0.024	71	0.024
12	0.040	42	0.022	72	0.028
13	0.091	43	0.032	73	0.031
14	0.106	44	0.034	74	0.032
15	0.065	45	0.026	75	0.031
16	0.020	46	0.013	76	0.029
17	0.072	47	0.013	77	0.026
18	0.089	48	0.022	78	0.023
19	0.063	49	0.026	79	0.019
20	0.020	50	0.022	80	0.016
21	0.039	51	0.014	81	0.014
22	0.053	52	0.005	82	0.012
23	0.039	53	0.006	83	0.010
24	0.018	54	0.010	84	0.009
25	0.026	55	0.011	85	0.007
26	0.031	56	0.008	86	0.005
27	0.021	57	0.005	87	0.002
28	0.008	58	0.001	88	0.000
29	0.004	59	0.000	89	0.003
				90	0.006