

## KNRQ-FM MINOR MODIFICATION

This technical report has been developed in support of a minor modification to station KNRQ-FM's licensed facility changing site to the Stonehenge tower (ASR#1033770). The new city of license, Aloha, OR, which was previously approved in MB Docket 10-118 is specified.

### Allocation analysis:

The proposed facility is fully spaced as evidenced in exhibit E1. It is noted that the one short-spacing in the channel study at Madras, OR was eliminated with the substitution of channel 243C1 in MB Docket No. 10-118.

Exhibit E2 demonstrates seventy (70) dBu coverage to the entire community of Aloha. The proposed 70 and 60 dBu contours are tabulated below. The ERP for the channel 250C1 facility is reduced to 54 kW to produce the equivalent for a maximum class C1. The 60 dBu of 72.42 rounds to 72 km.

N. Lat. = 45-29-20    W. Lng. = 122-41-40 NAD 27 Rounded					
HAAT and Distance to Contour, V-Soft 3-16 km, 131 points Method - FCC 30 SEC					
Azi.	AV EL	HAAT	dBk	70-F5 (KM)	60-F5 (KM)
000	56.6	423.4	17.32	51.71	75.03
045	60.3	419.7	17.32	51.51	74.75
090	83.0	397.0	17.32	50.28	73.12
135	58.2	421.8	17.32	51.62	74.91
180	108.4	371.6	17.32	48.89	71.34
225	85.0	395.0	17.32	50.17	72.98
270	74.8	405.2	17.32	50.72	73.71
315	216.8	263.2	17.32	42.29	63.28
<b>Ave El= 92.90 M HAAT = 387.10 M AMSL = 480.0 M</b>					

**Antenna and RF calculation:**

The 54 kW ERP facility will be combined into the Stonehenge Jampro master antenna system with a center of radiation at 170 meters AGL. The KNRQ-FM worst case contribution is proportionally calculated based on combined ERP of the existing stations at the site and the detailed measurements taken by and submitted and accepted in the stations last license renewal applications.

Thus a 13.02% increase in combined ERP will result in a 13.02% increase in the worst case occupational level of 1.556% of the maximum yielding 1.76% of the maximum permissible (Stonehenge reported measurements as % of maximum exposure). The worst case public level of 4.9685 % MPE would increase to 5.62% of the maximum public exposure level. Clearly, these levels are well below Commission limits.

KNRQ-FM ERP = 54 kW

KBOO-KFIS-KGON-KNRK-KPDQ-FM  
KWJJ-KXJM-KYCH-FM combined ERP = 414.8 kW from FCC records.

KNRQ-FM increase in combined ERP = 13.02%.

The complete Stonehenge report is attached. If, for any reason the Commission does not accept this methodology, an RF measurement condition is requested.

**Conclusion:**

It is concluded that the KNRQ-FM application is in full compliance with Commission rules and policies.

December 17, 2012

Charles M. Anderson

# E1 KNRQ-FM CHANNEL STUDY

REFERENCE

45 29 20.0 N.  
122 41 40.0 W.

CLASS = C1 Int = C1  
Current Spacings to 3rd Adj.  
----- Channel 250 - 97.9 MHz -----

DISPLAY DATES

DATA 12-17-12  
SEARCH 12-17-12

Call	Channel	Location		Azi	Dist	FCC	Margin	
KNRQ-FM	CP -N	250C1	Aloha	OR	313.0	5.48	244.5	-239.0
KNRQ-FM	LIC	250C	Eugene	OR	191.5	168.51	269.5	-101.0
R14020	DEL	251A	Seaside	OR	298.5	109.60	132.5	-22.9 (1)

(1) Now on channel 243A per Docket No. 10-118. Form 302 filed.

1358321	APP-D	251C1	Madras	OR	111.3	166.61	176.5	-9.9 (2)
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(2) Channel 243C1 substituted in Docket No. 10-118.

AL6416	VAC	251C1	Madras	OR	115.0	168.24	176.5	-8.3
R14020	DEL	251C1	Madras	OR	115.0	168.24	176.5	-8.3
KOMO-FM	RSV-A	249C	Belfair	WA	345.9	209.30	208.5	0.8
KOMO-FM	APP-D	249C	Belfair	WA	345.9	209.30	208.5	0.8
KOMO-FM	APP-D	249C	Belfair	WA	345.9	209.30	208.5	0.8
KOMO-FM	LIC-D	249C	Oakville	WA	345.9	209.30	208.5	0.8
KOMO-FM	LIC-Z	249C	Oakville	WA	345.9	209.30	208.5	0.8
KOMO-FM	RSV-A	249C	Belfair	WA	345.9	209.30	208.5	0.8
1353945	APP	252C3	Dallas	OR	205.5	78.01	75.5	2.5
1356434	APP	252C3	Dallas	OR	205.5	78.01	75.5	2.5
VA2391	VAC	252C3	Dallas	OR	217.8	80.06	75.5	4.6
1422290	RSV-A	252C3	Dallas	OR	217.8	80.06	75.5	4.6
1514250	RSV-A	252C3	Dallas	OR	217.8	80.06	75.5	4.6
1422277	RSV-A	252C3	Dallas	OR	217.8	80.06	75.5	4.6
KPPK	LIC	252A	Rainier	OR	345.3	79.82	74.5	5.3
1357368	APP	252C3	Dallas	OR	218.7	82.03	75.5	6.5
1513468	APP	252C3	Dallas	OR	217.9	84.37	75.5	8.9
1357070	APP	252C3	Dallas	OR	217.9	84.38	75.5	8.9
R14021	ADD	248C3	Manzanita	OR	283.4	97.36	75.5	21.9
KING-FM	LIC-D	251C	Seattle	WA	13.6	230.70	208.5	22.2

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Reference station has protected zone issue:

RSV-R = reserved - needs protection, RSV-A = allocation.

All separation margins include rounding



# Registration 1033770

 [Map Registration](#)

## Registration Detail

Reg Number	1033770	Status	Constructed
File Number	A0644844	Constructed	06/05/1991
EMI	No	Dismantled	
NEPA	No		

## Antenna Structure

Structure Type TOWER - Free standing or Guyed Structure used for Commu

### Location (in NAD83 Coordinates)

Lat/Long	45-29-19.4 N 122-41-44.4 W	Address	4700 COUNCIL CREST DR
City, State	PORTLAND , OR		
Zip	97239	County	MULTNOMAH
Center of AM Array		Position of Tower in Array	

### Heights (meters)

Elevation of Site Above Mean Sea Level	310.3	Overall Height Above Ground (AGL)	189.0
Overall Height Above Mean Sea Level	499.3	Overall Height Above Ground w/o Appurtenances	153.9

## Painting and Lighting Specifications

FAA Chapters 3, 4, 5, 12  
Paint and Light in Accordance with FAA Circular Number 70/7460-1K

## FAA Notification

FAA Study	2002-ANM-1415-OE	FAA Issue Date	08/13/2002
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## Owner & Contact Information

FRN	0018987529	Owner Entity Type	
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### Owner

Stonehenge Towers, LLC Attention To: C/O Steven Seward 1500 4th Ave, Ste 600 Seattle , WA 98101	P: (206)669-8842 F: E:
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### Contact

Ballew , Dean 4700 SE International Way P.O. Box 22169 Milwaukie , OR 97269	P: (503)659-1240 F: E: dballew@daywireless.com
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## Last Action Status

Status	Constructed	Received	07/28/2009
Purpose	Notification	Entered	07/28/2009
Mode	Interactive		

**Related Applications**<http://wireless2.fcc.gov/UlsApp/AsrSearch/asrRegistration.jsp?regKey=...>

# Output from NADCON for station STONEHENGE

North American Datum Conversion

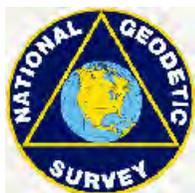
NAD 83 to NAD 27

NADCON Program Version 2.11

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Transformation #: 1                    Region: Conus

	Latitude	Longitude
NAD 27 datum values:	45 29 19.97383	122 41 40.05412
NAD 83 datum values:	45 29 19.40000	122 41 44.40000
NAD 27 - NAD 83 shift values:	0.57383	-4.34588 (secs.)
	17.716	-94.370 (meters)
Magnitude of total shift:		96.019 (meters)



[NGS HOME PAGE](#)

# **Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields**

**KBOO, KFIS, KGON, KNRK, KPDQ-FM,  
KWJJ-FM, KXJM and KYCH-FM**

**“Stonehenge” Shared Transmitter Site  
Portland, Oregon**

**Report of Measurements & Conclusions  
September 23, 2005**

This report details radio frequency radiation (RFR) measurements made on September 23<sup>rd</sup>, 2005, at the “Stonehenge” common transmitter site for KBOO, KFIS, KGON, KNRK, KPDQ-FM, KWJJ-FM, KXJM and KYCH-FM at 4700 SW Council Crest in Portland, Oregon. The transmitter site is also the location of a large number of land-mobile and cellular facilities.

The measurement equipment used consists of a Narda Microwave model 8718B RFR meter (SN: 7127) with a model A8722D E-Field probe (SN: 09014). This E-Field probe is broadband with a frequency coverage of 300 kHz to 50 GHz. The instrument set was calibrated in January of 2005.

The A8722D probe used is a “shaped” probe, meaning that the response to radio frequency fields follows the 1997 FCC Limits for Maximum Permissible Exposure (MPE) for Occupational/Controlled Exposure, resulting in a display on the 8718B meter of percentage of MPE. Because of the frequencies in use at this site, the MPE for General Population/Uncontrolled Exposure limit is one-fifth or 20% of the Occupational/Controlled Exposure limit. Readings in areas where access is available to the General Population (Uncontrolled), were multiplied by a factor of 5.

Measurement techniques used are consistent with generally accepted practices. Steps and procedures used in making these measurements are similar to those printed in Section 3 of OET Bulletin 65, Edition 97-01, August 1997, published by the FCC Office of Engineering and Technology.

At the time of the measurements, all FM broadcast stations were operating with licensed facilities and power levels. All of the stations except KNRK are combined into a common antenna manufactured by Jampro. The Jampro antenna is top mounted on the support structure. The KNRK antenna is a single bay directional antenna mounted on a mast above the Jampro common antenna. Four of the FM broadcast stations were transmitting IBOC (In Band On Channel) digital signals when these measurements were made. Two of these stations, KGON and KWJJ-FM feed the digital signal into auxiliary antennas side mounted on the support structure. One of the stations, KBOO, combines the analog and digital signal together. The fourth station, KNRK combines the analog and digital signal together and feeds both to the separate KNRK antenna mentioned above.

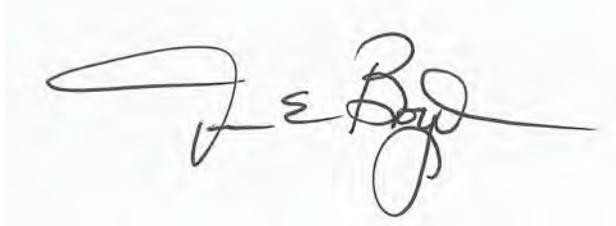
Areas on the site access road, walking trails around and past the site, the street leading to the site, a couple of nearby dwellings, a nearby communications site, a city water reservoir and small park surrounding the reservoir, and the transmitter building were measured to gather data for this report.

**Conclusions of this study are as follows:**

- **No areas accessible by the general public have radio frequency radiation levels exceeding the General Population /Uncontrolled MPE.**
- **No areas in the transmitter building have radio frequency radiation levels exceeding the Occupational/Controlled MPE.**
- **Certain areas on the tower structure do have radio frequency radiation levels which exceed the Occupational/Controlled MPE. Access to the tower is restricted by the tower owner (Stonehenge) and a strict safety plan is posted at the site. It is titled “4700 Tower Safety Plan” and was updated on February 1, 2000. The plan is reviewed annually. The plan, in addition to climbing safety, details what areas can be occupied without exceeding the Occupational/Controlled MPE and what areas require shut down of the FM broadcast facilities or changeover to auxiliary antennas.**

A complete listing of the measurement data collected is shown on pages 3 and 4 of this report. A drawing of the site is on page 5. Floor layouts for the transmitter building are on page 6. Pictures of the site are on page 7 through 16. A topographical map showing the location of the transmitter site is on page 17. The FCC Limits for Maximum Permissible Exposure curve is shown on page 18. A picture of the test equipment used is shown on page 19.

All measurements were made by me. I am an experienced radio broadcast engineer. I have experience making these measurements. My technical qualifications are a matter of record with the Federal Communications Commission.

A handwritten signature in black ink, appearing to read "J E Boyd". The signature is written in a cursive, flowing style with a long horizontal line extending to the right.

James E. Boyd  
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Boyd Broadcast Technical Services  
21818 SW Columbia Circle  
Tualatin, OR 97062  
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**Measurement Data**  
**Areas Accessible to General Population**

(% of General Population/Uncontrolled MPE)

Dwelling at 4636 SW Council Crest Drive	2.0625%
Bertha Reservoir Park area	3.5625
SW Council Crest Drive at site access gate	3.281
Access road from gate to upper level parking area	3.75
Driveway into Portland General Electric communications site just west of Stonehenge tower structure	4.9685
Dwelling at 4646 SW Council Crest Drive (on north side of access road and Stonehenge tower structure)	2.625
Walking trail west and south sides of Stonehenge tower	2.25
Grass area on south side of Stonehenge tower	1.875
Area under Stonehenge tower structure	1.5
Parking area upper level of transmitter building	2.0625
Sidewalk attached to upper level of transmitter building	2.4375
Sidewalk from upper level to lower level of transmitter building	2.0625
Access road from upper level to lower level of transmitter building	1.6875
Lower level parking area east side of transmitter building	2.7185
Sidewalk along lower level on east and north sides of transmitter building (access to HVAC and electric utility meters)	0.656
Grass area on east edge of lower level parking area	2.7185

Data shown is highest reading observed in listed area.

**Measurement Data**  
**Areas Inside Transmitter Building**  
**Not Accessible to the General Population**

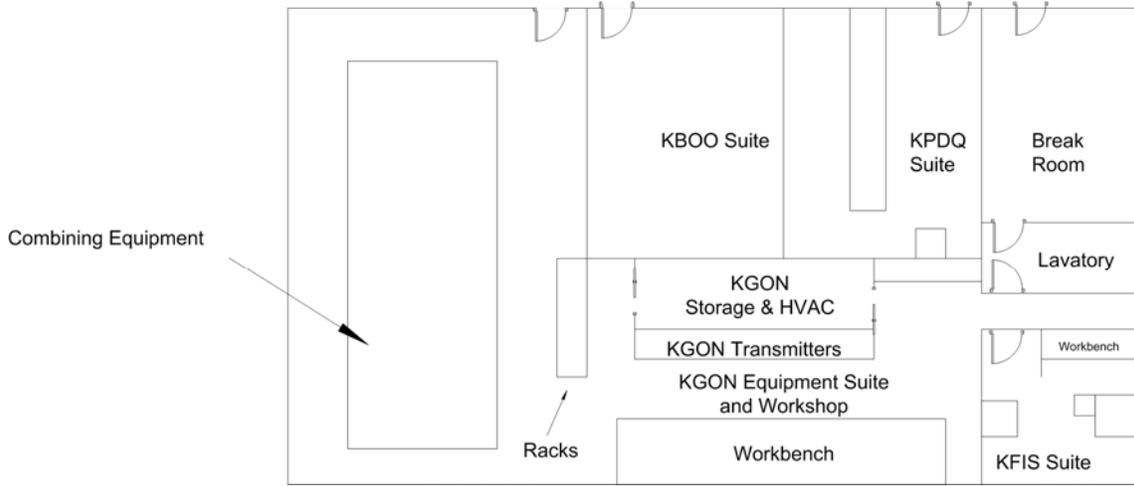
(% of Occupational/Controlled MPE)

Break Room	0.9562%
Lavatory	0.7132
KFIS Transmitter Suite	0.7500
KGON Transmitter Suite (in front of transmitters, includes workbench area)	1.556
KGON Transmitter Suite (behind transmitters)	0.6187
Combiner Room	9.881
KPDQ-FM Transmitter Suite	0.4125
KBOO Transmitter Suite	0.4687
Land-Mobile Suite	0.4875
Tunnel from transmitter building to tower structure	0.1687
KNRK Transmitter Suite	0.2625
KYCH-FM Transmitter Suite	0.2250
KWJJ-FM Transmitter Suite	0.3000
Generator Room and Storage Area	0.3375
KXJM Transmitter Suite	0.1687

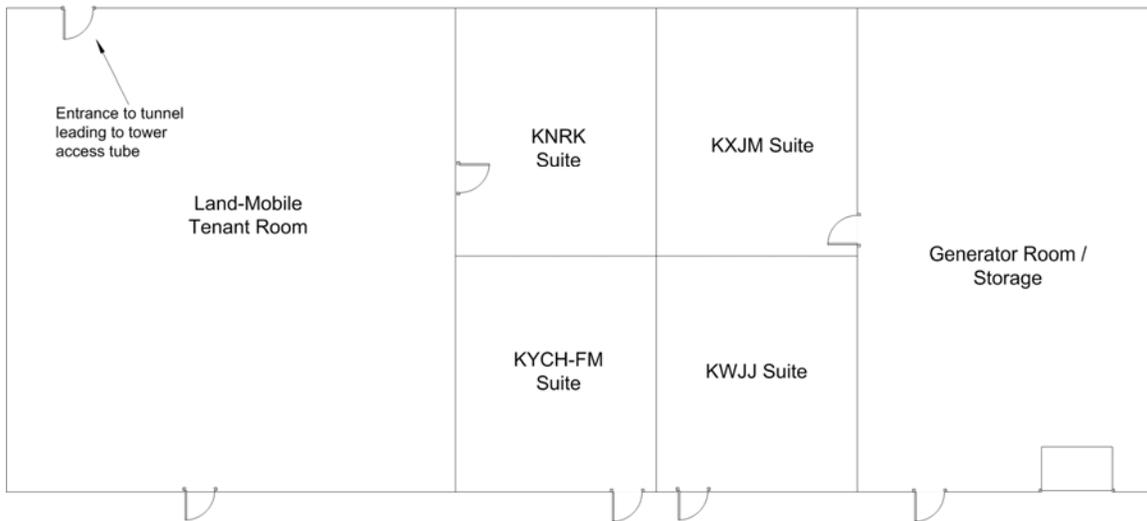
Data shown is highest reading observed in listed area.



# Stonehenge Upper Level Layout



# Stonehenge Lower Level Layout





View of Stonehenge Tower Structure from Distance



Close-up view of tower structure. Antenna with radome at very top is KNRK. Spiral antenna below it is combined antenna for all other stations. Auxiliary antennas can be seen on legs of structure.



Base of tower structure



Upper Level of Building and Parking Area



East Side of Building and Lower Parking Area



Break Room



KFIS Transmitter Suite



KGON Transmitter Suite and Workbench



Combiner Room



KPDQ-FM Suite



KBOO Transmitter Suite



Land-Mobile Room



Another View of Land-Mobile Room



KNRK



KYCH-FM Suite



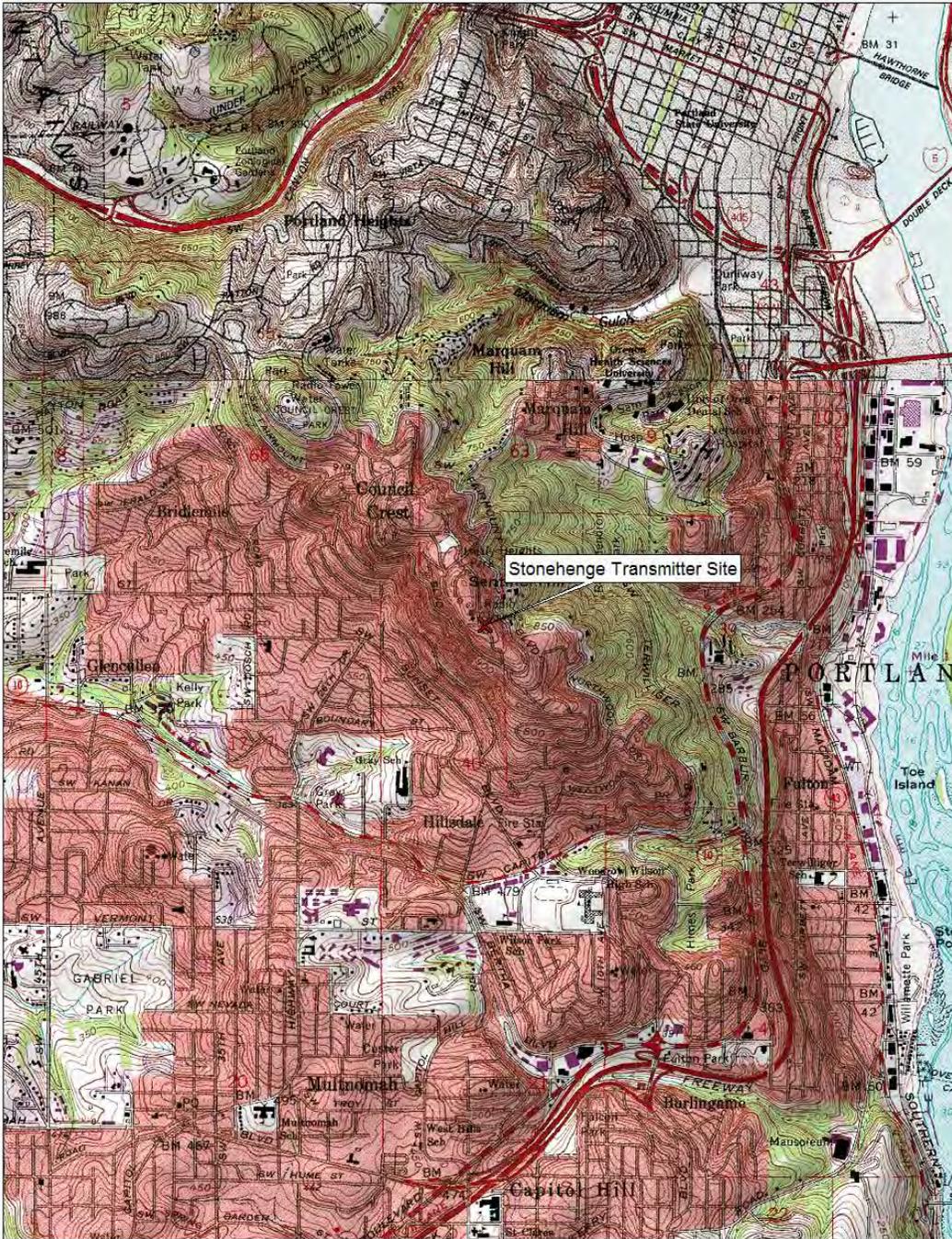
KWJJ-FM Transmitter Suite



KXJM Suite



Generator and Storage Area



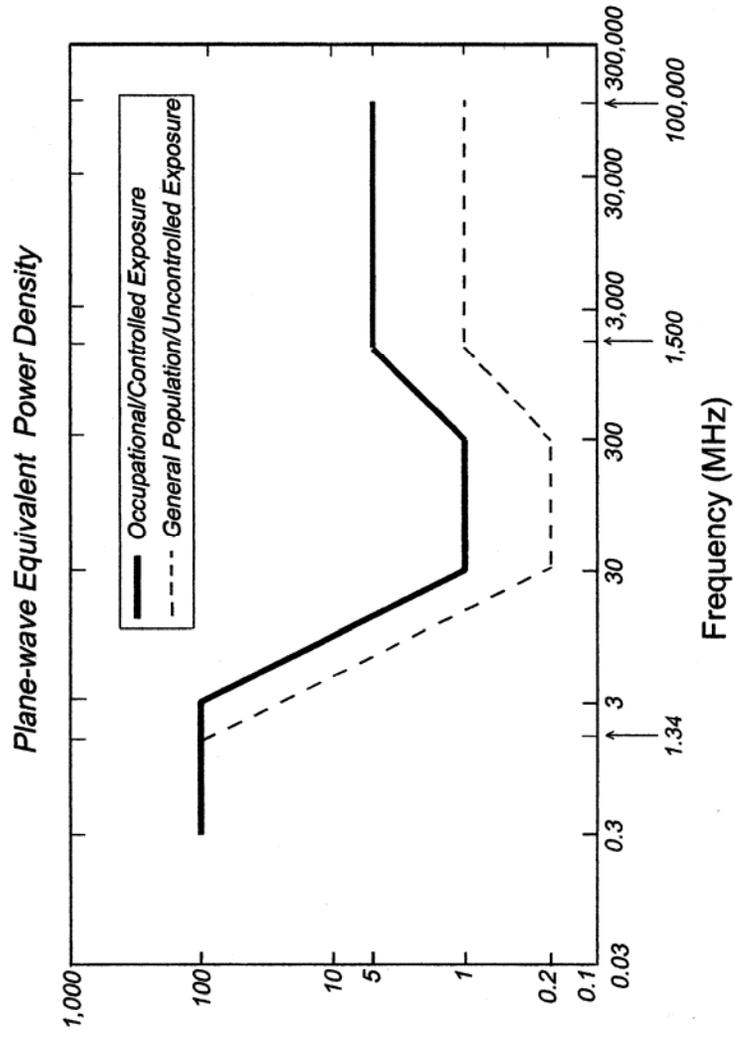
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www.delorme.com

MN (17.1° E)

0 800 1600 2400 3200 4000 ft  
Data Zoom 13-0

Topographic Map Showing Transmitter Site

**Figure 1. FCC Limits for Maximum Permissible Exposure (MPE)**





Narda Test Equipment