

**Report on a Study Performed for
Gray Television Licensee, LLC, regarding
Low-Power Television Station W14EZ-D,
Channel 14, Myrtle Beach, SC
Modification of license
FCC File 0000198444**

**Concerning Potential Out-of-Band-Emissions and
Receiver Adjacent Channel Rejection for Land Mobile
Operations in the lower adjacent band to TV channel 14**

September 27, 2022

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INTRODUCTION and BACKGROUND

This study has been prepared for Gray Television Licensee, LLC, the licensee of low-power digital television station W14EZ-D ("W14EZ"), Myrtle Beach, SC. W14EZ has been granted a construction permit, FCC File Number 0000198444, to modify its low-power facility using the parameters as defined in the permit.

In the construction permit authorization that was granted the following condition must be met: *"During equipment tests, authorized by Section 73.1610 of the Commissions Rules, the permittee shall take adequate measures to identify and substantially eliminate objectionable interference which may be caused to existing land mobile radio facilities in the 460 to 470 MHz band. Documentation that objectionable interference will not be caused to existing land mobile radio facilities shall be submitted along with the request for Program Test Authority..."*

To meet this condition placed in the construction permit, MSW was requested to study the potential impact that the modified W14EZ facility may have on active and authorized Land Mobile ("LM") facilities operating below channel 14.

MSW performed its study based on the parameters shown in the construction permit to determine if the combined as-built post-transmitter filter added to a the transmitter response would protect LM facilities from Out-of-Band Emissions ("OOBE") and receiver desensitization, referred to as Adjacent Channel Rejection Ratio ("ACRR") in this report, from W14EZ operating with the facility on TV channel 14.

The study focused on a circular area with a radius of 149 km with the center point being the transmitter site coordinates as stated in the construction permit. The area studied is shown in Appendix 1 of this report.

EXECUTIVE SUMMARY

MSW studied the predicted OOBE interference from the W14EZ facility into authorized LM stations operating below TV channel 14. The potential impact that W14EZ might have on LM receiver ACRR was also studied.

Based on the results of this study the following conclusions were reached.

1. Utilization of two 8-Pole cascaded post-transmitter filters was found to be effective in significantly reducing OOBE and protecting currently authorized LM stations.
2. There were no cases of OOBE interference into Land Mobile operations reported in this study with the use of a cascaded filter.
3. There were no cases of LM receiver ACRR being below 0 dB reported in this study.

Considering the foregoing, W14EZ meets the requirement of the construction permit by demonstrating with this study that objectionable interference is not predicted to be caused into Land Mobile operations. The remainder of this report gives the parameters and methodology used in conducting the study along with an analysis of the results.

SCOPE OF STUDY AND METHODOLOGY

The scope of this study consists of two parts with each part analyzing the impact of potential channel 14 OOB interference from W14EZ into a LM receiver and LM receiver ACRR due to W14EZ operating on an adjacent channel to LM base or mobile stations.

The first part of this study consisted of an overall area study based on a hypothetical LM station, both fixed and mobile, operating on a frequency close to the channel 14 band edge with default operating parameters (i.e. antenna height, bandwidth, etc.). This serves as an indicator of the effectiveness of post-transmitter filtering and antenna radiation characteristics in protecting LM operations close to the band edge and shows the approximate extent of interference and ACRR in terms of distance from the TV transmitter site. The parameters used for W14EZ are found in Table 1 and the generic parameters used for both fixed and mobile LM operations are found in Table 2 of this report.

This area based interference study was performed using the Longley-Rice Irregular Terrain Model ("ITM") to predict interference caused by OOB from W14EZ into both fixed and mobile LM operations using the generic parameters. The study focused on a circular area with a radius of 149 km from a center point with coordinates being the W14EZ transmitter site.

The circular area was divided into cells with a size of approximately 1 km per side. The assumed LM receiver location was considered to be at the geographic center of the cell. A path profile was created between the television transmitter site and the cell center followed by the ITM analysis. The OOB loss of the post-transmitter filter, at the LM station frequency, was added to the coupling factor, calculated from the bandwidth of the LM station and the 500 kHz measurement bandwidth used for digital television stations, to the received field strength. LM antenna gain and line loss were then added to the received field strength to obtain the final value used for interference prediction. The reference value used for interference prediction is 17 dBu¹.

ACRR calculations were performed by using the free space loss from the television transmit antenna to the cell center point. The received power level in the direction of the cell included calculated losses due to terrain, calculated antenna azimuth and elevation discrimination and coupling losses based on the bandwidth of the LM station and the 3 dB half-power bandwidth of the television station (approximately 5.38 MHz). LM antenna gain and assumed transmission line loss for fixed base stations was also considered. The reference value used for ACRR is approximately 80 dB which is a typical receiver off-frequency rejection characteristic² near the

¹ See §73.687 (e)(4)(ii) of the Rules

² Value obtained by researching ACRR values from various receiver manufacturers

television station's band edge. ACRR typically increases as the LM frequency moves further away from the band edge and was considered in this study.

The second part of the study consisted of analyzing interference and receiver ACRR into currently authorized fixed and mobile LM facilities. A list of potentially impacted LM facilities was created from the FCC's Universal Licensing System ("ULS") database by searching for all active and licensed LM facilities within a culling distance of 149 km from the W14EZ transmitter site. The entire area studied is shown in Appendix 1 of this report.

Interference and ACRR calculations were performed similar to the cell analysis described for the first part of the study except the authorized LM facilities (e.g. frequency, antenna height, etc.) were utilized. Other study parameters utilized in the study, including ITM parameters, are shown in Table 3.

Tables 4 and 5 are example calculations for both the interference and receiver ACRR for one of the fixed base stations studied. The purpose of these examples is to show in more detail how the study calculations were performed.

For authorized mobile and temporary fixed LM operations a study was conducted similar to the general cell area study discussed above. A circular area was defined using the radius of operation for the mobile LM facility as authorized. If no radius was defined then a default radius of 48 km was used. The center point used was the coordinates of the mobile LM operation as authorized. The circular area was divided into 1 km/side cells and calculations were made at the geographic center of each cell. A pass/fail determination was made for each cell for both interference and receiver ACRR as calculated from the received signal of W14EZ. After analyzing all cells within the circular area the number of failures was compared to the total number of cells analyzed. If the total number of failures was at or under 2% of the total area then the amount of interference or receiver ACRR below 0 dB was considered de minimis and the facility was considered to have passed.

Land Use/Land Clutter losses were not considered in this study for either OOBE interference or receiver ACRR calculations for both study parts.

For OOBE interference calculations the transmitter 500 kHz bandwidth lower adjacent channel sideband pre-filter response was added to the cascaded post-transmitter filter to obtain the total OOBE rejection of the transmission system (See Figure 2).

Most all LM operations use vertical antenna polarization. W14EZ has been authorized to utilize elliptical polarization. The total received power at an LM station would be dependent on the polarization of the LM received antenna. A conservative value of 6 dB was used in this study when considering antenna cross polarization discrimination. Received power was calculated based on the total power radiated from W14EZ in both horizontal and vertical planes and then applying the applicable cross polarization factor based on the polarization of the LM facility.

STUDY PARAMETERS

The parameters used for W14EZ operating on channel 14 and LM operations below channel 14 are shown in Tables 1 and 2, respectively. Table 2 shows the general LM analysis parameters for the area cell study. For the individual studies to each LM facility the authorized parameters were used as shown in the LM station's authorization.

Table 1 - Parameters for W14EZ

Parameter	Value
Analyzed TV Station	W14EZ-D
TV Channel	14 (470-476 MHz)
Latitude (NAD83)	33-43-50.9
Longitude (NAD83)	79-04-31.4
Height of Antenna Center of radiation (AMSL)	162.8 m
ERP (15 kW-H, 4.5 kW-V)	19.5 kW (H+V)
Antenna Type	Non-Directional
Polarization	Elliptical
Elevation Pattern	Real
Electrical Tilt	0.5 degrees
Antenna Mechanical Tilt Amount	N/A
Antenna Mechanical Tilt Orientation	N/A
Antenna Pattern Relative Field per Azimuth and Depression Angle	Calculated
Post-transmitter Filter Type	Dual Cascaded 8-Pole

Table 2 - Parameters for Land Mobile Stations

Parameter	Value
Antenna Type	Omni-directional
Frequency (MHz)* (Lower Adjacent TV channel 14 band)	469.75
Bandwidth*	30 kHz
Height of Antenna Center of radiation (AGL)*	10.0m FB, 3.0m MO
Polarization*	Vertical
Receive Antenna Gain*	11.0 dBd FB, 0.0 dBd MO
Antenna Pattern Relative Field per Azimuth Bearing	1.0
Antenna Pattern Relative Field per Depression Angle	1.0
Receive Line Loss for Fixed Base stations only	2.0 dB
Receiver Threshold	-120.0 dB
Receiver ACRR (Fixed value used for cell study)	86.4 dB**

* Value assumed for cell analysis. The authorized parameter was used for individual LM station studies

** Calculated based on LM frequency separation from the television station band edge frequency

Table 3 below shows the parameters used for the Irregular Terrain Model in deriving the W14EZ channel 14 station OOB field intensities inside a circular area with a 149 km radius for the area cell study. These parameters were also used for determining the signal strength of W14EZ OOB into each LM station found inside the circular area (see Appendix 1).

Since the FCC Rules do not specify a defined distance to be studied for LM operations operating below channel 14 a study radius of 149 km was utilized for this study. This distance is based on the 130 km distance specified in § 74.709 (b) of the Rules from a defined center point for LM operations to the protected LM contour. This distance is added to the distance from the LPTV transmitter to the edge of its 76 dBu, F50,10 contour, which is approximately 19 km for W14EZ.

Table 3 – Parameter settings utilized in Land Mobile Study

Parameter	Value	
Study Radius	149.00 km	
Study Centerpoint Latitude (NAD 83)	33-43-51.0 N	
Study Centerpoint Longitude (NAD 83)	79-04-31.0 W	
Cross Polarization Discrimination Factor	6.0 dB	
Target Study cell size	1.0 km/side	
Study Path Distance Increment	0.1 km	
Terrain Database	1 arc second	
Location Variability	50 %	
Time Variability	10 %	
Confidence	50 %	
Ground Permittivity	15.0	
Ground Conductivity	0.005 S/m	
Surface Refractivity	301.0 N-units PPM	
Longley-Rice Mode ‡	1 or 3	
Climate Code	5 Continental Temperate	
Utilize Land Use/Land Clutter in analysis	False	
Interference criteria utilized [See §73.687 (e)(4)(ii) of the Rules]	17.0 dBuV/m	
Number of cells analyzed	69,947	
Area analyzed	69,748.45 sq km	
Area predicted to receive field strength => 17 dBu	Fixed Base	0.00 sq km
Area predicted to experience ACRR < 0dB	Fixed Base	0.00 sq km
Area predicted to receive field strength => 17 dBu	Mobile	0.00 sq km
Area predicted to experience ACRR < 0dB	Mobile	0.00 sq km

‡ 1 - Individual mode used for LM station analysis, 3 – Broadcast mode used for cell analysis

STUDY METHODOLOGY AND EXAMPLE

Tables 4 and 5 show the methodology that was used for calculating interference and receiver ACRR, respectively, into the LM Base Station shown below.

Freq Mhz	Call Sign	Svc Code	Svc Cls	DTV->LM Dist km	DTV->LM Az deg	Ant Pol	HAAT m	HAGL m	Gain dB	BW khz
464.9750	WQEZ528	IG	FB2	10.8	53.4	V	17.5	12.0	4.4	11.2

Table 4 - Methodology for Predicting Interference into a Land Mobile receiver from a DTV Station

Parameter	Value
Land Mobile Station Frequency *	469.9750 MHz
Longley-Rice Calculated Received Field Strength [F50,10]TV Station	99.1 dBuV/m
Transmitter + Filter loss at frequency	73.1 dB
Transmitting and receiving antenna discrimination, combined†	0.1 dB
DTV coupling into LM (Bandwidth: DTV=500 kHz, LM=11.2 kHz)	16.5 dB
Cross-polarization discrimination	3.7 dB
LM antenna gain	4.4 dB
LM line loss	2.0 dB
Calculated equivalent field strength	8.1 dBuV/m
Interference criteria utilized (typical LM Receiver Sensitivity)	12.7 dBuV/m
Margin to interference	4.6 dB
Analysis result**	Pass

Table 5 - Methodology for Predicting ACRR into a Land Mobile receiver from a DTV Station

Parameter	Value
Guard Band between DTV and LM Station	0.3288 MHz
Transmit ERP (19.5 kW)	72.9 dbm
Free Space Path Loss for dipole antenna at frequency and distance	102.4 dB
Terrain Loss	0.0 dB
Transmitting and receiving antenna discrimination†	0.1 dB
DTV coupling into LM (Bandwidth: DTV=5.38 MHz, LM=11.2 kHz)	26.8 dB
Effective cross-polarization discrimination	3.7 dB
LM antenna gain	4.4 dB
LM line loss	2.0 dB
LM receiver out-of-band rejection (Based on Guard Band)	85.7 dB
Effective received DTV station interference power	-143.4 dBm
LM receiver sensitivity	-120.0 dBm
ACRR (receiver desensitization margin)	23.4 dB
Analysis result (Passes if ACRR is not negative)	Pass

* Assumed repeater input frequency

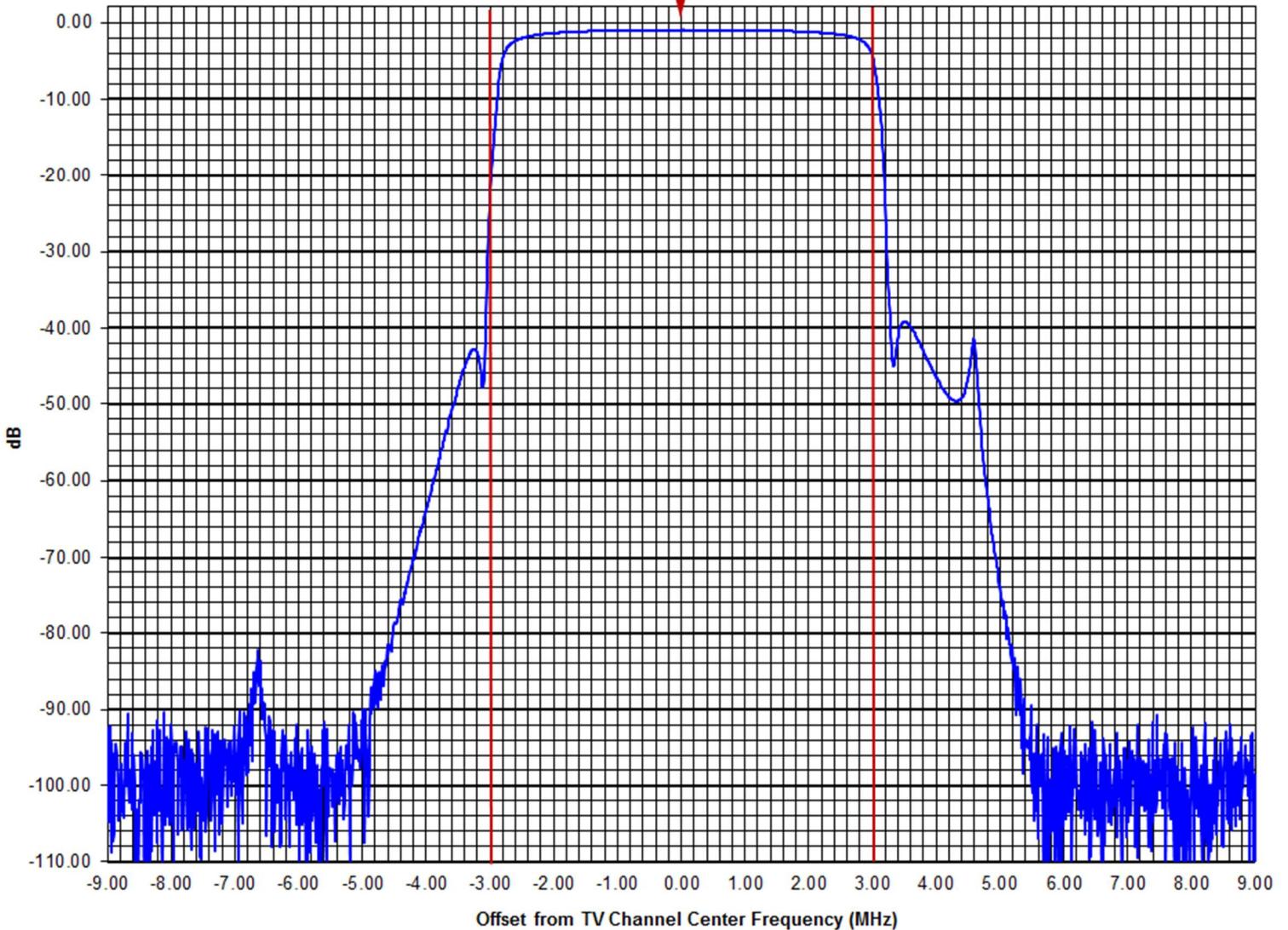
† Only transmit antenna azimuth and elevation discrimination factors are considered

** If analysis fails additional Post-transmitter filtering would be required.

DTV POST-TRANSMITTER FILTER

The plot below in Figure 1 shows the OOB response of two cascaded 8-Pole filters for W14EZ operating on channel 14. The filter response was provided by the filter manufacturer.

Figure 1
Post-Transmitter Filter Response

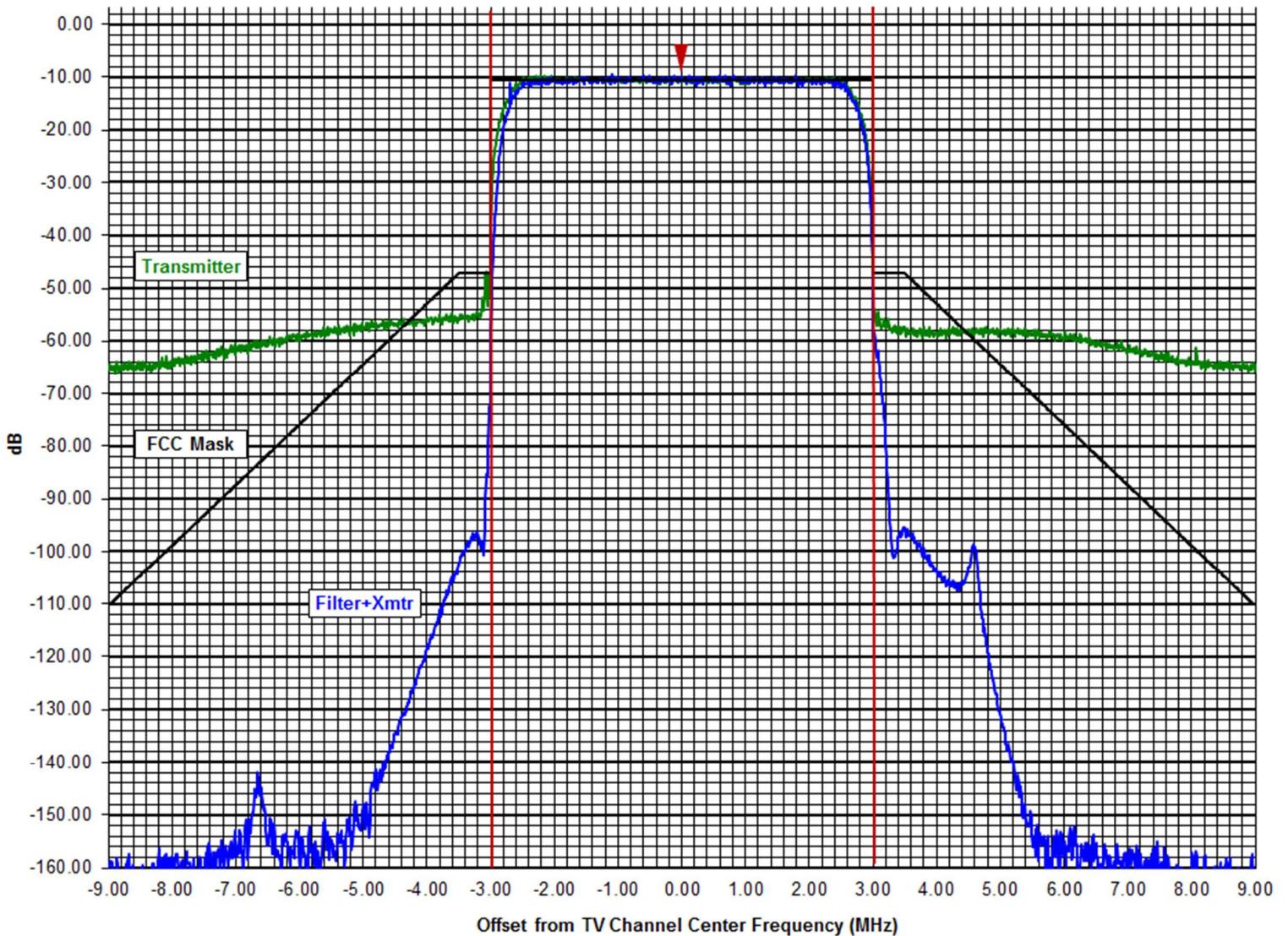


As shown above, this cascaded filter adds significant attenuation to OOB, particularly near the band edge (-3.0 MHz). Combined with the transmitter pre-filter response, very effective filtering of OOB is provided.

TOTAL DTV TRANSMITTER PLUS POST-TRANSMITTER FILTER RESPONSE

Shown below in Figure 2 is the transmitter OOB pre-filter response (green plot). Total response of both the two cascaded 8-Pole post-transmitter filters plus the transmitter response is also shown (blue plot). The full-service FCC mask response is shown for reference (black plot) to show the effectiveness of the filtering.

Figure 2
Response of Transmitter plus Two Cascaded 8-Pole Post-Transmitter Filters



As shown above, the cascaded filter adds significant attenuation to OOB beginning at -3 Mhz which is the lower end of TV channel 14. Combined with a typical transmitter pre-filter response, very effective filtering of OOB is provided and surpasses that of the full-service FCC mask.

The response of the post-transmitter filter was obtained from the filter manufacturer.

ANALYSIS RESULTS

This study was performed in response to a condition placed in the construction permit, FCC File Number 0000198444, to modify the transmission facility of W14EZ-D, channel 14, Myrtle Beach, SC. Specifically, the condition states that W14EZ must not cause objectionable interference into Land Mobile operations operating in the 460-470 MHz band below channel 14.

The map in Appendix 1 shows the W14EZ 51 dBuV/m protected contour along with all LM facilities located within a radius of 149 km from the transmitter site and operating in the band from 460 to 470 MHz which is below TV channel 14.

The area study that was conducted using the parameters found in Tables 1 and 2 of this report did not show any of the 69,947 cells studied to receive either interference or a receiver ACRR below 0 dB.

There were 952 authorized LM facilities studied, consisting of both fixed base and mobile.

There were 1,764 Fixed Base LM facilities studied. Appendix 2 is a list, stacked in ascending order, of 30 of the fixed base stations with the lowest interference margin, with the lowest margin being 4.6 dB. The list in Appendix 3 is similar to Appendix 2 but for receiver ACRR, with the lowest value being 22.1 dB.

There were 3,989 Mobile LM facilities studied. Appendix 4 is a list of 30, stacked in ascending order, of the mobile stations with the lowest interference margin, with the lowest margin being 11.5 dB. The list in Appendix 5 is similar to Appendix 4 but for receiver ACRR, with the lowest value being 22.5 dB.

Due to the large number of LM facilities studied a full list was not included with this report. The full list is available and can be provided upon request.

Regarding LM receiver ACRR, adjacent channel rejection characteristics may vary based on the frequency separation of the desired LM channel from the band edge of the higher power station. Rejection could increase from 80 to 90 dB or more depending on the frequency separation. Rejection also depends on the front end architecture of the LM radio as designed by the manufacturer. ACRR calculation is not dependent on the type of post-transmitter filter used since it is not an OOB issue but rather that of a sensitive LM radio being in close proximity to a higher power facility, like that of a television station. As stated earlier in this report, no cases of receiver ACRR being below 0 dB were predicted in the area cell study or into authorized LM operations.

Table 7 below shows a high level summary of the results for current authorized LM stations studied within a 149 km radius of the granted W14EZ transmitter site.

Table 7 – Statistics from the Analysis of Current Licensed LM facilities

Item	Value	Comment
LM Authorizations Found	952	-
Individual LM Locations Studied	5,753	-
Closest LM Frequency to Band Edge	469.9750 MHz	11 Found
Closest Fixed Base Land Mobile Location	6.2 km	WQVQ553
Fixed Base Stations:		
Lowest Predicted IX Margin	4.6 dB	WQEZ528
Number Predicted to Receive IX	0	-
Lowest Predicted ACRR	22.1 dB	WRJG346
Stations Affected by ACRR < 0 dB	0	-
Mobile LM Operations:		
Lowest Predicted IX Margin	11.5 dB	WQEZ528
Number Predicted to Receive IX	0	-
Lowest Predicted ACRR	22.5 dB	WQMJ709
Stations Affected by ACRR < 0 dB	0	-

CONCLUSION

MSW studied the predicted OOB interference into authorized LM stations operating within a radius of 149 km from a center point defined by the W14EZ transmitter site coordinates with W14EZ operating on channel 14 as defined in its construction permit. The potential impact that W14EZ might have on LM receiver ACRR was also studied.

Based on the results of the study the following conclusions were reached.

1. Utilization of two 8-Pole cascaded post-transmitter filters was found to be effective in significantly reducing OOB and protecting currently authorized LM stations.
2. There were no cases of OOB interference into Land Mobile operations reported in this study with the use of a cascaded filter.
3. There were no cases of LM receiver ACRR being below 0 dB reported in this study.

Considering the above, W14EZ meets the requirement of the construction permit by demonstrating with this study that objectionable interference will not be caused into Land Mobile operations.

This study conducted by MSW is based on the ITM prediction model. Actual field conditions including, but not limited to, propagation conditions, errors and omissions in the FCC database, active and passive intermodulation products and LM receiver characteristics may affect the actual results in the field and are considered outside the control of MSW.

This study was performed using defined locations extracted from the FCC ULS database (e.g. geographical coordinates and well defined boundaries, such as counties and radius and center point) as granted for both fixed base and mobile LM operations. The FCC LM commercial and private databases contain hundreds of authorizations for itinerant users that are authorized over the entire country, states and other wide areas. It is impractical to attempt to analyze those operations without knowing the specific location of a LM receiver if and when they are deployed in the area studied.

MSW stands ready to answer any questions regarding this report and to assist W14EZ in responding to any issues that may be reported from LM operators.

CERTIFICATION

The undersigned author of this report, Joseph L. Snelson, Jr., is a Certified Professional Broadcast Engineer (CPBE) as recognized by the Society of Broadcast Engineers and possesses over 50 years of experience in Broadcast Engineering including Television signal analysis, propagation, coverage and interference prediction. He is a contract employee of Meintel, Sgrignoli and Wallace, LLC, Broadcast Television & Radio Engineers, and was assigned to study the impact that the granted facility for W14EZ-D would have on authorized Land Mobile facilities operating on the lower adjacent band to channel 14 (460 - 470 MHz).

He has prepared numerous studies of this type pertaining to the protection of Land Mobile Radio Service stations from adjacent channel television station transmissions that have been submitted and accepted by the FCC.

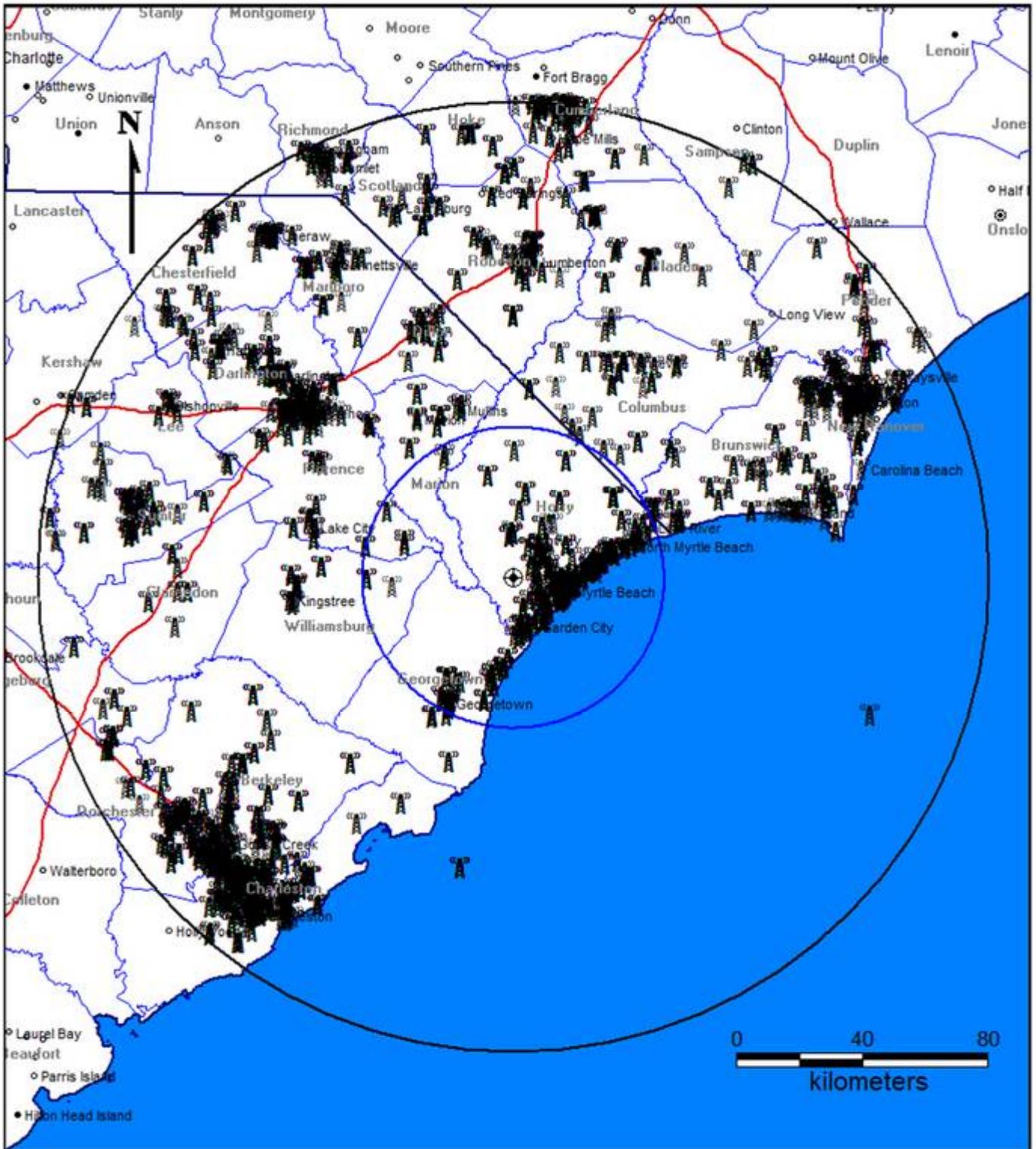
The undersigned hereby certifies that all statements made in this report are true and correct to the best of his own knowledge except, where noted, when data or information has been supplied by others, which he believes to be correct.



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APPENDIX 1
W14EZ-D, Channel 14, Myrtle Beach, SC
Land Mobile Facilities, 460-470 MHz, within 149 km of the W14EZ-D Transmitter Site
W14EZ-D 51 dBu Protected Contour Shown in Blue



APPENDIX 2
Land Mobile Fixed Base Stations with the Lowest Interference Margins
Listing of the Lowest 30 out of 1,764 Fixed Base LM Facilities

Freq Mhz	Call Sign	Svc Code	Svc Cls	DTV->LM Dist km	DTV->LM Az deg	Ant Pol	HAAT m	HAGL m	Gain dBd	BW khz	IX Mgn dB	ACRR dB
464.975	WQEZ528	IG	FB2*	10.8	53.4		17.5	12	4.4	11.2	4.6	23.4
464.9375	WRCH960	YG	FB6*	16.3	100.1		70.3	70.1	1	7.6	23.9	32.2
464.95	WQOT981	IK	FB6C*	15.7	170.8		311	308		11.2	25.3	31.8
464.925	WQAA826	IG	FB2*	24.8	85.6		46	45.7	3.4	11.2	27.7	31.8
464.65	WQTU896	IG	FB6*	10.3	163.1		55.7	54.9	4.8	11.2	28.7	23.8
464.7375	WQMJ709	IG	FB2*	9.7	121.3		12.3	12.2	3	11.2	29	24.9
464.9	WRJG346	YG	FB2*	12.7	37.2		25.5	23.2	7.4	11.2	29.7	22.1
464.85	KNHC475	IG	FB2*	16.3	156.4		135	133	5.9	11.2	32.8	26
464.875	WPSD731	IG	FB2*	19.3	98.8	V	41.5	40	6	11.2	32.9	27.2
464.6875	WQRR210	IG	FB2*	17	147.5		49	48	4.4	11.2	33.1	28.5
464.7875	WRCZ989	IG	FB2*	19.7	98.3		70.8	72	3.5	7.6	33.8	32
464.725	WQAA826	IG	FB2*	24.8	85.6		80.5	79	4.9	11.2	34.7	31.1
464.325	WRMP287	IG	FB2*	6.8	81.2		16.8	12.2	5.2	7.6	35	22.7
464.6125	WRPG224	IG	FB2*	13.3	99.3		15.4	10.7		7.6	36.8	32.5
464.6375	WRMM803	IG	FB6*	26.9	8.1		109.2	97.5	4.8	4	37.4	36.6
464.3875	WQMJ709	IG	FB2*	11.1	60.3		11.8	12.2	3	11.2	38.1	27
464.75	WQSV504	IG	FB2*	19.1	100.9		43.9	42.6		11	38.4	33.7
464.675	WQEJ722	IG	FB2*	27.9	81.5		72.8	76.8	3.5	11.2	38.6	33.7
464.625	WPIR628	IG	FB2*	25.9	183.9		73.9	70.1	3.1	11.2	39.1	33.5
464.1875	WRJG346	YG	FB2*	12.7	37.2		25.5	23.2	7.4	11.2	41.8	24.2
464.7875	WPSQ230	YG	FB6*	60.4	273.1		161.7	152.4	4.8	4	42.3	43.2
464.7125	WQHJ775	IG	FB2*	50.6	210.3		29.6	27.4	6	11.2	42.9	39.1
464.4	WQNB951	IG	FB2*	23.9	87		49.6	51.8	4.9	11	43.5	31.8
464.375	WQCX414	IG	FB2*	16.4	118.8		19	20	1.8	11.2	43.6	31.6
464.2625	WQMJ709	IG	FB2*	11.7	72.6		7.9	7.9	2.8	11.2	43.7	27.9
464.4125	WQRR425	IG	FB2*	28.6	80.6		40.3	39.6	5.1	7.6	44.2	34.7
464.35	WQBG328	IG	FB2*	25	84.9		32.4	35.1	6	11.2	44.7	31.1
464.7875	WPSQ230	YG	FB8*	67.8	268.2	V	166.1	158	3	11.2	45.1	41.5
464.25	WQUZ723	IG	FB2*	16.5	118.8		55.5	54	4.4	11.2	45.3	29.3
464.975	WQKM222	IG	FB2*	72.5	300		24	21.3		11	45.7	64.5

Note: Asterisk after Service Class indicates frequency is the output. Input frequency used for study

APPENDIX 3
Land Mobile Fixed Base Stations with the Lowest Receiver ACRR
Listing of the Lowest 30 out of 1,764 Fixed Base LM Facilities

Freq Mhz	Call Sign	Svc Code	Svc Cls	DTV->LM Dist km	DTV->LM Az deg	Ant Pol	HAAT m	HAGL m	Gain dBd	BW khz	IX Mgn dB	ACRR dB
464.9	WRJG346	YG	FB2*	12.7	37.2		25.5	23.2	7.4	11.2	29.7	22.1
464.325	WRMP287	IG	FB2*	6.8	81.2		16.8	12.2	5.2	7.6	35	22.7
464.975	WQEZ528	IG	FB2*	10.8	53.4		17.5	12	4.4	11.2	4.6	23.4
464.65	WQTU896	IG	FB6*	10.3	163.1		55.7	54.9	4.8	11.2	28.7	23.8
464.1875	WRJG346	YG	FB2*	12.7	37.2		25.5	23.2	7.4	11.2	41.8	24.2
464.7375	WQMJ709	IG	FB2*	9.7	121.3		12.3	12.2	3	11.2	29	24.9
463.5	WQQW935	IG	FB2*	9.1	147.1		24.4	18	4.9	11.2	63.8	25.9
464.85	KNHC475	IG	FB2*	16.3	156.4		135	133	5.9	11.2	32.8	26
463.3625	WRJG346	YG	FB2*	12.7	37.2		25.5	23.2	7.4	11.2	69.2	26.5
464.3875	WQMJ709	IG	FB2*	11.1	60.3		11.8	12.2	3	11.2	38.1	27
464.875	WPSD731	IG	FB2*	19.3	98.8	V	41.5	40	6	11.2	32.9	27.2
464.0375	WQTB251	IG	FB6*	15.6	138.1		12	9.1	6	11.2	50.2	27.8
464.2625	WQMJ709	IG	FB2*	11.7	72.6		7.9	7.9	2.8	11.2	43.7	27.9
464.0875	WQUN200	IG	FB2*	11.8	119.1		12	10	3	11.2	49.9	28.2
463.4875	WQMJ709	IG	FB2*	9.7	121.3		12.3	12.2	3	11.2	66.7	28.3
464.6875	WQRR210	IG	FB2*	17	147.5		49	48	4.4	11.2	33.1	28.5
463.6875	WQMJ709	IG	FB2*	10.3	27		8.5	8	2.8	11.2	61.8	28.6
464.25	WQUZ723	IG	FB2*	16.5	118.8		55.5	54	4.4	11.2	45.3	29.3
463.4125	WQXH265	IG	FB2*	13.3	359.6		24.2	30	4.4	11.2	70.9	29.8
462.45	WQKA453	IG	FB2*	10.4	46.5		33.2	23	4.4	11.2	85.7	30
464.2	WQVM425	IG	FB2*	18.3	95.2		10.3	13	4.4	11.2	47.1	30.4
463.75	WQRE525	IG	FB2*	17	114.2		54.6	0	4.9	11.2	61.3	30.6
463.2125	WQAB399	IG	FB2*	17	114.7		52.1	54.9	6	11.2	77.3	30.7
464.2375	WQIC803	IG	FB2*	16.7	143.6		61.4	64	3	11.2	47.8	30.8
463.675	WRPQ495	IG	FB2*	17.2	112.4		45.6	44.2	4.9	11.2	64.8	30.9
463.775	WQOT981	IK	FB6C*	19.2	59		143	100	5.5	11.2	61.8	31
464.725	WQAA826	IG	FB2*	24.8	85.6		80.5	79	4.9	11.2	34.7	31.1
464.35	WQBG328	IG	FB2*	25	84.9		32.4	35.1	6	11.2	44.7	31.1
463.725	WQRQ344	IG	FB2*	16.9	146		89	88	4.4	11.2	63.5	31.1
462.5	KNAF521	IG	FB2*	17.3	111.9		72	75	5	20	89.9	31.1

Note: Asterisk after Service Class indicates frequency is the output. Input frequency used for study

APPENDIX 4
Mobile Operations with the Lowest Interference Margins
Listing of the Lowest 30 out of 3,989 Mobile LM Facilities

Freq Mhz	Call Sign	Svc Code	Svc Cls	DTV->LM Dist km	DTV->LM Az deg	Ant Pol	HAAT m	HAGL m	Gain dBd	BW khz	Ix Mgn dB	ACRR dB
469.9750	WQEZ528	IG	MO	0.3	227.7			0.0		11.2	11.5	30.3
469.9625	WQIY719	IG	MO	0.3	227.7			0.0		11.2	16.9	30.7
469.9375	WRDM691	IG	MO	0.3	227.7			0.0	3.0	11.2	23.7	30.4
469.9375	WRCH960	YG	MO6	0.3	227.7			0.0		7.6	24.0	32.4
469.9500	WQOT981	IK	MO	0.3	227.7			0.0		11.2	24.2	30.7
469.7375	WQMJ709	IG	MO	3.3	166.4			0.0	3.0	11.2	26.6	22.5
469.9250	WQAA826	IG	MO	3.3	57.5			0.0		11.2	28.1	32.2
469.9125	WQRQ640	IG	MO	0.3	227.7			0.0		11.2	32.6	30.9
469.9125	WQEZ528	IG	MO	0.3	227.7			0.0		11.2	34.3	32.5
469.7875	WRCZ989	IG	MO	0.3	227.7			0.0		7.6	35.0	33.2
469.9750	WQUV876	IG	MO	44.8	278.7			0.0		7.6	35.1	55.6
469.8125	WQXH265	IG	MO	0.3	227.7			0.0		11.2	35.5	31.1
469.8750	WPSD731	IG	MO	0.3	227.7			0.0		11.2	35.5	29.9
469.8000	WQWR561	IG	MO	0.3	227.7			0.0		11.2	35.6	31.4
469.7000	WQBE327	IG	MO	0.3	227.7			0.0	1.8	11.2	35.7	31.5
469.7625	WQRR210	IG	MO	0.3	227.7			0.0		11.2	35.7	31.5
469.3875	WQMJ709	IG	MO	3.3	57.5			0.0	3.0	11.2	36.1	25.0
469.6875	WQRL942	IG	MO	0.3	227.7			0.0		11.2	36.3	31.8
469.6875	WQRR210	IG	MO	0.3	227.7			0.0		11.2	36.3	31.8
469.8125	WQUW460	IG	MO	0.3	227.7			0.0		11.2	36.6	32.2
469.8250	WQSS552	IG	MO	0.3	227.7			0.0		11.2	36.6	31.0
469.7250	WQAA826	IG	MO	0.3	227.7			0.0		11.2	37.0	33.5
469.8625	WQRQ204	IG	MO	0.3	227.7			0.0		11.2	37.3	31.5
469.6000	WQWA951	IG	MO	0.3	227.7			0.0	1.0	11.2	37.6	31.1
469.6125	WRPG224	IG	MO	0.3	227.7			0.0		7.6	37.6	33.4
469.8500	KNHC475	IG	MO	0.3	227.7			0.0		11.2	37.9	31.1
469.6375	WRMM803	IG	MO6	0.3	227.7			0.0		4.0	38.0	37.3
469.6250	WPIR628	IG	MO	0.3	227.7			0.0		11.2	38.2	32.8
469.9000	WRJG346	YG	MO	0.3	227.7			0.0		11.2	38.3	30.7
469.7500	WQSV504	IG	MO	7.5	115.1			0.0		11.0	38.4	33.7

Notes:

1. Mobile analysis performed within a defined area of operation from mobile LM coordinates
2. 48 km radius used for mobile area of operation if not specified in authorization
3. Mobile Distance/Azimuth is shown to the cell with the lowest margin
4. Average mobile interference margin and/or ACRR over the area are shown

APPENDIX 5
Land Mobile Fixed Base Stations with the Lowest Receiver ACRR
Listing of the Lowest 30 out of 3,989 Fixed Base LM Facilities

Freq Mhz	Call Sign	Svc Code	Svc Cls	DTV->LM Dist km	DTV->LM Az deg	Ant Pol	HAAT m	HAGL m	Gain dBd	BW khz	IX Mgn dB	ACRR dB
469.7375	WQMJ709	IG	MO	3.3	166.4			0.0	3.0	11.2	26.6	22.5
469.3875	WQMJ709	IG	MO	3.3	57.5			0.0	3.0	11.2	36.1	25.0
468.4875	WQMJ709	IG	MO	3.3	166.4			0.0	3.0	11.2	64.3	26.0
469.2875	WQFD906	IG	MO	0.3	227.7			0.0		11.0	43.0	28.5
469.2625	WQMJ709	IG	MO	3.9	78.4			0.0		11.2	44.6	28.8
469.0875	WQUN200	IG	MO	3.3	166.4			0.0		11.2	50.4	28.8
468.6875	WQMJ709	IG	MO	3.3	57.5			0.0		11.2	62.4	29.1
466.5125	WQQV950	IG	MO	3.3	57.5			0.0	3.0	11.2	83.1	29.2
469.8750	WPSD731	IG	MO	0.3	227.7			0.0		11.2	35.5	29.9
468.7500	WQFD906	IG	MO	0.3	227.7			0.0		11.0	60.6	30.1
469.9750	WQEZ528	IG	MO	0.3	227.7			0.0		11.2	11.5	30.3
469.9375	WRDM691	IG	MO	0.3	227.7			0.0	3.0	11.2	23.7	30.4
469.3750	WQCX414	IG	MO	0.3	227.7			0.0		11.2	42.3	30.4
469.9625	WQIY719	IG	MO	0.3	227.7			0.0		11.2	16.9	30.7
469.9500	WQOT981	IK	MO	0.3	227.7			0.0		11.2	24.2	30.7
469.9000	WRJG346	YG	MO	0.3	227.7			0.0		11.2	38.3	30.7
469.9125	WQRQ640	IG	MO	0.3	227.7			0.0		11.2	32.6	30.9
469.9000	WQRL942	IG	MO	0.3	227.7			0.0		11.2	38.5	30.9
469.8250	WQSS552	IG	MO	0.3	227.7			0.0		11.2	36.6	31.0
469.8125	WQXH265	IG	MO	0.3	227.7			0.0		11.2	35.5	31.1
469.6000	WQWA951	IG	MO	0.3	227.7			0.0	1.0	11.2	37.6	31.1
469.8500	KNHC475	IG	MO	0.3	227.7			0.0		11.2	37.9	31.1
468.2875	WQFD906	IG	MO	0.3	227.7			0.0		11.0	77.3	31.2
467.3625	WQQE492	IG	MO	6.7	45.3			0.0	3.0	11.2	87.7	31.3
469.8000	WQWR561	IG	MO	0.3	227.7			0.0		11.2	35.6	31.4
469.7000	WQBE327	IG	MO	0.3	227.7			0.0	1.8	11.2	35.7	31.5
469.7625	WQRR210	IG	MO	0.3	227.7			0.0		11.2	35.7	31.5
469.8625	WQRQ204	IG	MO	0.3	227.7			0.0		11.2	37.3	31.5
469.6875	WQRL942	IG	MO	0.3	227.7			0.0		11.2	36.3	31.8
469.6875	WQRR210	IG	MO	0.3	227.7			0.0		11.2	36.3	31.8

Notes:

1. Mobile analysis performed within a defined area of operation from mobile LM coordinates
2. 48 km radius used for mobile area of operation if not specified in authorization
3. Mobile Distance/Azimuth is shown to the cell with the lowest margin
4. Average mobile interference margin and/or ACRR over the area are shown