

# **DELAWDER COMMUNICATIONS, INC.**

2121 Eisenhower Avenue, Suite 200

Alexandria, Virginia 22314

(703) 299-9222

## **ENGINEERING REPORT**

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Federated Rural Electric Association

Jackson, MN (K45EH, Channel 45+ Major Modification)

### **EXHIBIT 6**

#### **LPTV MAJOR MODIFICATION – INTERFERENCE STUDIES**

##### **I. Introduction**

1. Federated Rural Electric Association (“FREA”) is the licensee of K45EH, Jackson, MN, channel 45(+), with a pending major modification for a power increase (FCC File Number BMJPTTL-20000821AHA). That application was recently removed from MX Group M286 and is ready for processing. By this engineering exhibit, FREA demonstrates that all primary and secondary TV stations are protected by the proposed Jackson facilities.

2. Interference studies are provided below to demonstrate adequate protection to all known LPTV (TV translator and TV booster) stations, analog TV stations and digital TV stations. All terrain studies use USGS/DMA three arc-second data. All population information in this application is taken from year 1990 US Census Data.

3. Attached as Table 1 is a Dataworld TV Spacing Study for Channel 45(+). The Dataworld Study was conducted from a reference site at the proposed transmitter location. A discussion and/or a detailed interference study are included for certain stations listed in Table 1 that require protection from the proposed facility. All other stations listed on Table 1 are either too far away to require a detailed study (and are obviously protected), or do not require protection pursuant to the FCC Rules. Tables 2A and 2B, attached, include the proposed service and interference contour distances for the proposed facility.

4. The use of frequency offset is required, and is made in order to add protection to any nearby analog co-channel station. The applicant will maintain the requested offset per 47 C.F.R. Section 74.761 by use of a precision oscillator supplied by the transmitter manufacturer.

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**II. Interference Studies**

Regarding KSTC-TV, Minneapolis-St. Paul, MN, TV Channel 45z

5. In accordance with 47 C.F.R. Section 74.705(d)(1), a co-channel UHF TV station is protected to a C/I ratio that is no less than 28 dB for offset carrier frequency operation. As demonstrated by Figure 1A, attached, the 36 dBu (F50,10) interference contour for the proposed facility will not overlap with the 64 dBu (F50,50) service contour of KSTC-TV; therefore, adequate protection to KSTC-TV will exist. (Figure 1B, attached, is a tabulation of the KSTC-TV service contour.)

Regarding KMTV-DT, Omaha, NE, Channel 45d

6. In accordance with 47 C.F.R. Section 74.706(d)(1), a co-channel DTV UHF station is protected to a C/I ratio of 21 dB. As demonstrated by Figure 2A, attached, the 20 dBu (F50,10) interference contour for the proposed facility will overlap with the Grade B Service Contour of KMTV (which is used as the noise-limited service contour of KMTV-DT). (Figure 2B is a tabulation of the KMTV service contour.)

7. Using the service and interference contours, interference is predicted to result; however, the FCC allows for the use of the Longley-Rice point-to-point radio propagation model, version 1.2.2 (hereafter "Longley-Rice") in order to demonstrate that interference will not be caused to a DTV station. (A description of the allowed use of Longley-Rice {as stated by the FCC}, and a description of the Longley-Rice studies included with this application, are made in Section III, below.) By using Longley-Rice, as demonstrated by Figure 2C, co-channel interference to KMTV-DT is not predicted to result from the proposed facility.

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### Regarding KDLT-TV, Sioux Falls, SD, TV Channel 46z

8. In accordance with 47 C.F.R. Section 74.705(d)(4), a first adjacent-channel UHF TV station is protected to a C/I ratio that is no less than -15 dB. As demonstrated by Figure 3A, attached, the 79 dBu (F50,50) interference contour for the proposed facility will not overlap with the 64 dBu (F50,50) service contour of KDLT-TV; therefore, adequate protection to KDLT-TV will exist. (Figure 3B, attached, is a tabulation of the KDLT-TV service contour.)

### III. DESCRIPTION OF LONGLEY-RICE STUDIES

9. 47 C.F.R. Sections 74.705(e), and 74.707(e) allow for the use of Longley-Rice in order to demonstrate protection to TV broadcast analog stations and LPTV stations, respectively. Furthermore, Paragraph 105 of the FCC's *In the Matter of Amendment of Parts 73 and 74 of the Commission's Rules for Digital Low Power Television, Television Translator, and Television Booster Stations and to Amend Rules for Digital Class A Television Stations - Report and Order* (FCC 04-220, released September 30, 2004) states that the use of Longley-Rice is permitted as an optional showing for processing analog LPTV (and TV translator and TV booster) stations to all protected TV stations (primary, secondary, digital or analog) without requiring a waiver. (Previously, a waiver request was necessary in order to demonstrate protection using the Longley-Rice Methodology.)

10. EDX Engineering, Inc.'s computer software program MSITE™ includes the Longley-Rice version 1.2.2 model; and the MSITE™ program is used to conduct the Longley-Rice studies which are included with this application. With the exception of not being able to identify and use population centroids, the procedures and parameters specified by the FCC's OET Bulletin No. 69, *Longley-Rice Methodology for Evaluating TV Coverage and Interference* (dated July 2, 1997) are used by the MSITE™ program. (This will have no significant effect on the study results.) The grid size for each study is two kilometer spacing (the spacing used by the FCC) or less. (For protection to

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LPTV, TV translator and TV booster stations, the grid size used is one kilometer or less.)

11. The software is limited to a study distance of 399 kilometers; therefore, in some instances, the study is truncated at 399 kilometers from the proposed transmitter site. Interference is not predicted to result beyond 399 kilometers from the proposed LPTV transmitter site. Furthermore, any contour overlap area is located completely within 399 kilometers; and, therefore, the contour overlap area is completely studied.

12. For each Longley-Rice study, the dipole factor adjustment specified by OET Bulletin No. 69 is applied to both the point-to-point evaluation and the contour distances. Also, USGS three arc-second terrain data is used. The product of each study is a map which identifies those examined points of the study-grid (within the protected station's applicable service, Grade B or noise-limited contour) which are above or below the C/I protection requirement. (For the included studies, all C/I results are above the required protection standards.)

13. As allowed by OET Bulletin No. 69, only those grid points which are predicted to receive a field strength from the desired station that is above the threshold for reception are considered. The MSITE<sup>TM</sup> output exhibits of this application show the threshold of reception as the corresponding minimum allowed receive power.

14. As with most complicated computer propagation models, much of the underlying data of each study cannot be easily generated or reported in text form. To the extent possible, if requested by the FCC, additional data regarding the Longley-Rice studies will be provided.

**Delawder Communications, Inc.**  
**Alexandria, VA**

Table 1, Page 1  
Thursday, June 02, 2005

Dataworld LPTV/TV Translator Interference Study

**Title: Jackson MN**

Channel: 45 Offset: Unspecified (656-662 MHz) Analog  
Database: FCC 6/1/2005 12:00:00 AM

ERP: 3 kW  
HAAT: 100.0 m

Latitude: N 43° 36' 12.0"  
Longitude: W 94° 59' 33.0"  
Safety Zone: 32.0 km

Call	Auth	Licensee name	Chan	HAAT(m)	ERP	Latitude	Br-to	Dist	Req
City of License		St	FCC File Number	Zone	HAMS(m)	Longitude	-from	(km)	(km)
NEW	APP	PAPPAS TELECASTING COMPANIES	44 -		1	N 43° 22' 46.0"	152.5	28.06	
ESTHERVILLE		IA	BNPTTL-20000831ALK		513.7	W 94° 49' 55.0"	332.6		

**DeLawder Note: Not determined Mxed by FCC; No interference study is required.**

K45EH	APP	FEDERATED RURAL ELECTRIC ASSOCIA	45 +		3	N 43° 36' 12.0"	0.0	0.000	
JACKSON		MN	BMJPTTL-20000821AHA		525.0	W 94° 59' 33.0"	0.0		

**DeLawder Note: Applicant; This application or facility that's being modified.**

K45EH	LIC	FEDERATED RURAL ELECTRIC ASSOCIA	45 +		1.8	N 43° 36' 12.0"	0.0	0.000	
JACKSON		MN	BLTTL-19950314IL		525.0	W 94° 59' 33.0"	0.0		

**DeLawder Note: Applicant; This application or facility that's being modified.**

K45GV	CP	DEAN M. MOSELY	45 o		1	N 43° 06' 42.0"	154.9	60.31	
EMMETTSBURG		IA	BNPTTL-20000830AGZ		414.1	W 94° 40' 38.0"	335.1		

**DeLawder Note: Not determined Mxed by FCC; No interference study is required.**

NEW	APP	WEST CENTRAL MINNESOTA EDUCATION	45 +		7	N 43° 35' 09.0"	90.9	85.87	
FROST		MN	BNPTTL-20000831BSC		426.4	W 93° 55' 46.0"	271.7		

DA: ERI ALP8L1-HSE-45 @ 0.0°

**DeLawder Note: Not determined Mxed by FCC; No interference study is required.**

K67GH	APP	MS COMMUNICATIONS, LLC	45 o		150	N 43° 30' 17.0"	265.6	126.8	
SIOUX FALLS		SD	BPTTL-20020819ABQ		934.0	W 96° 33' 22.0"	84.5		

DA: SCA 4DR-4-2HW @ 0.0°

**DeLawder Note: Too Far; No interference study is required.**

K45FR	LIC	RENVILLE COUNTY TV CORPORATION	45 -		0.99	N 44° 45' 33.0"	4.2	128.8	
OLIVIA		MN	BLTTL-20030110ACY		449.6	W 94° 52' 24.0"	184.3		

DA: BOG B8UA @ 270.0°

**DeLawder Note: Too Far; No interference study is required.**

K45DJ	LIC	MINNESOTA VALLEY TV IMPROVEMENT	45 +		1.45	N 44° 48' 17.0"	340.9	141.5	
GRANITE FALLS		MN	BLTTL-19920529IC		404.0	W 95° 34' 49.0"	160.5		

**DeLawder Note: Too Far; No interference study is required.**

KSTC-TV	LIC	KSTC-TV, LLC	45 o	430.0	5000	N 45° 03' 45.0"	41.6	219.4	
MINNEAPOLIS-ST. PAUL		MN	BLCT-20020318AAJ	II	706.0	W 93° 08' 21.0"	222.9		

**DeLawder Note: Attached study shows adequate protection; See Engineering Statement.**

KMTV	CP	EMMIS TELEVISION LICENSE, LLC	45	425.5	1000	N 41° 18' 25.0"	198.7	268.9	
OMAHA		NE	BPCDT-19991026ABT	II	768.2	W 96° 01' 37.0"	18.0		

Digital channel

**DeLawder Note: Attached study shows adequate protection; See Engineering Statement.**

KDLT-TV	LIC	RED RIVER BROADCAST CO., LLC	46 o	589.0	4000	N 43° 30' 18.0"	265.6	126.8	
SIOUX FALLS		SD	BLCT-20011120ABO	II	1017.0	W 96° 33' 22.0"	84.5		

**DeLawder Note: Attached study shows adequate protection; See Engineering Statement.**

>> End of channel 45 study <<

TABLE 2A - JACKSON, MN F50,50 CONTOURS

DATE: June 3, 2005

DISTANCES TO CONTOURS (Kilometers):

Antenna COR elevation (AMSL): 525 mtrs Average HAAT: 92 mtrs

Frequency: 659.0000 MHz

Coordinates: N 43 36 12.00 W 94 59 33.00

F(50,50) Curves Number of Contours: 5 2

AZ (degs)	HAAT (m)	ERPd (kW)	CONTOUR LEVELS (dBU):				
			89.0	80.0	79.0	74.0	70.0
0.0	89	3.0000	4.3	7.2	7.6	10.1	12.6
15.0	94	3.0000	4.4	7.4	7.8	10.4	12.9
30.0	98	3.0000	4.5	7.6	8.0	10.6	13.2
45.0	101	3.0000	4.6	7.7	8.1	10.8	13.4
60.0	103	3.0000	4.6	7.8	8.2	10.9	13.6
75.0	104	3.0000	4.6	7.8	8.2	10.9	13.6
90.0	106	3.0000	4.7	7.9	8.3	11.0	13.8
105.0	103	3.0000	4.6	7.8	8.2	10.9	13.6
120.0	101	3.0000	4.6	7.7	8.1	10.8	13.5
135.0	104	3.0000	4.6	7.8	8.3	10.9	13.6
150.0	120	3.0000	4.9	8.4	8.8	11.7	14.7
165.0	98	3.0000	4.5	7.6	8.0	10.6	13.2
180.0	88	3.0000	4.3	7.2	7.6	10.1	12.6
195.0	95	3.0000	4.4	7.5	7.9	10.5	13.0
210.0	92	3.0000	4.4	7.3	7.8	10.3	12.8
225.0	87	3.0000	4.2	7.1	7.5	10.0	12.5
240.0	82	3.0000	4.1	6.9	7.3	9.7	12.1
255.0	81	3.0000	4.1	6.9	7.2	9.6	12.0
270.0	76	3.0000	3.9	6.7	7.0	9.4	11.7
285.0	70	3.0000	3.8	6.4	6.8	9.0	11.2
300.0	63	3.0000	3.6	6.1	6.5	8.6	10.8
315.0	65	3.0000	3.7	6.2	6.5	8.7	10.9
330.0	88	3.0000	4.2	7.1	7.6	10.0	12.5
345.0	92	3.0000	4.4	7.3	7.8	10.3	12.8

TABLE 2B - JACKSON, MN F50,10 CONTOURS

DATE: June 3, 2005

DISTANCES TO CONTOURS (Kilometers):

Antenna COR elevation (AMSL): 525 mtrs Average HAAT: 92 mtrs

Frequency: 659.0000 MHz

Coordinates: N 43 36 12.00 W 94 59 33.00

F(50,10) Curves Number of Contours: 5 2

AZ (degs)	HAAT (m)	ERPd (kW)	CONTOUR LEVELS (dBu):				
			46.0	36.0	29.0	20.0	19.0
0.0	89	3.0000	46.8	72.9	108.0	156.9	162.5
15.0	94	3.0000	47.6	73.7	109.0	157.8	163.5
30.0	98	3.0000	48.3	74.4	109.9	158.7	164.4
45.0	101	3.0000	48.7	74.9	110.4	159.3	164.9
60.0	103	3.0000	49.0	75.2	110.8	159.6	165.3
75.0	104	3.0000	49.1	75.3	110.9	159.8	165.4
90.0	106	3.0000	49.5	75.7	111.4	160.2	165.9
105.0	103	3.0000	49.0	75.2	110.8	159.6	165.3
120.0	101	3.0000	48.8	74.9	110.5	159.3	165.0
135.0	104	3.0000	49.2	75.4	111.0	159.9	165.5
150.0	120	3.0000	51.4	78.1	113.7	162.6	168.2
165.0	98	3.0000	48.3	74.4	109.8	158.7	164.4
180.0	88	3.0000	46.7	72.8	107.9	156.8	162.4
195.0	95	3.0000	47.9	73.9	109.3	158.2	163.8
210.0	92	3.0000	47.4	73.4	108.7	157.6	163.2
225.0	87	3.0000	46.5	72.6	107.6	156.5	162.1
240.0	82	3.0000	45.6	71.7	106.5	155.5	161.0
255.0	81	3.0000	45.3	71.4	106.2	155.2	160.7
270.0	76	3.0000	44.5	70.6	105.2	154.3	159.6
285.0	70	3.0000	43.3	69.5	103.8	153.1	158.3
300.0	63	3.0000	42.1	68.2	102.3	151.8	156.9
315.0	65	3.0000	42.3	68.5	102.6	152.1	157.1
330.0	88	3.0000	46.5	72.6	107.7	156.6	162.2
345.0	92	3.0000	47.3	73.4	108.7	157.6	163.2