

**DELAWDER COMMUNICATIONS, INC.**

5568 General Washington Drive, Suite A-218

Alexandria, Virginia 22312

(703) 658-5390

**ENGINEERING REPORT**

---

Minnesota Valley TV Improvement Corporation  
Granite Falls, MN (Channel 33 Displacement Application)

**EXHIBIT EE & EXHIBIT NO. 6**

**LPTV MODIFICATION APPLICATION**

**I. INTRODUCTION**

1. This Engineering Exhibit has been prepared on behalf of Minnesota Valley TV Improvement Corporation (MVTVI) in support of a modification to Low Power TV station K32DR, Granite Falls, Minnesota, which is currently licensed on Channel 32(-). By this application, MVTVI is seeking "DTV displacement relief" by proposing to migrate its LPTV operation from Channel 32(-) to Channel 33(z), and by specifying various technical changes necessary to facilitate use of Channel 33(z). Pursuant to 47 C.F.R. Section 74.3572(a)(2)(ii), this application proposes a change in output channel, together with other technical changes which are necessary to avoid interference and, therefore, is not a major change modification.

**II. CHANNEL DISPLACEMENT OF LICENSED CHANNEL 32 FACILITY**

2. KELO-TV, Sioux Falls, South Dakota has been allotted use of Channel 32 for Digital TV (DTV) from its transmitter site located 161.9 kilometers south-southwest of the authorized K32DR transmitter site at Granite Falls. Pursuant to 47 C.F.R. Section 73.3572(a)(2)(iii), because the K32DR transmitter site is located less than 265 kilometers from the KELO-TV transmitter site, K32DR qualifies for displacement relief.

**DELAWDER COMMUNICATIONS, INC.**

5568 General Washington Drive, Suite A-218

Alexandria, Virginia 22312

(703) 658-5390

---

**ENGINEERING REPORT**

---

Minnesota Valley TV Improvement Corporation  
Granite Falls, MN (Channel 33 Displacement Application)

**III. GENERAL EXHIBITS SUPPORTING APPLICATION**

3. The following engineering exhibits are attached in support of this application:

EXHIBIT NO. 6: Interference Studies (Included in this exhibit)

EXHIBIT NO. 7: Environmental Statement

EXHIBIT A: Waiver Request

**DELAWDER COMMUNICATIONS, INC.**

5568 General Washington Drive, Suite A-218

Alexandria, Virginia 22312

(703) 658-5390

**ENGINEERING REPORT**

---

Minnesota Valley TV Improvement Corporation  
Granite Falls, MN (Channel 33 Displacement Application)

4. All terrain averages are determined using USGS/DMA three arc-second data.

**IV. INTERFERENCE STUDIES**

5. Protection to the following stations may cause various design constraints to the proposed Channel 33 transmit facility:

- a. K18DI, Granite Falls, MN, Licensed LPTV Channel 18+;
- b. K33CR, Appleton, MN, Licensed LPTV Channel 33+;
- c. K33CT, Olivia, MN, Licensed LPTV Channel 33-;
- d. KAAL, Austin, MN, DTV Channel 33 Allotment.

6. A discussion and/or a detailed interference study to each station listed above was previously provided in BPTTL-19990427JD. While those discussions are included herein, the interference are unchanged and will be submitted only at the request of the FCC.

**DELAWDER COMMUNICATIONS, INC.**

5568 General Washington Drive, Suite A-218

Alexandria, Virginia 22312

(703) 658-5390

---

**ENGINEERING REPORT**

---

Minnesota Valley TV Improvement Corporation  
Granite Falls, MN (Channel 33 Displacement Application)

7. The following is a list of the licensed and proposed transmit facilities for K32DR:

	<u>Licensed</u>	<u>Proposed</u>
Channel:	32	33
Offset:	minus	zero
N Latitude (NAD 27):	44° 48' 17"	no change
W Longitude (NAD 27):	95° 34' 49"	no change
City, State:	Granite Falls, MN	no change
Trans. Output Power:	0.100 kW (-10.0 dBk)	0.0785 kW (-11.05 dBk)
Line Loss:	1.93 dB	0.70 dB
Antenna Type:	Bogner B16UO (omni)	MCi 955116
Antenna Orientation:	N/A (omni)	no change
Antenna Beamtilt:	none	no change
Antenna Gain:	13.5 dB	13.32 dB
Max. ERP:	1.44 kW (1.58 dBk)	no change
Ground Elevation:	309.37 meters AMSL	no change
Radiation Center:	95.10 meters AGL	no change

8. The use of frequency offset is required in order to protect one or more co-channel NTSC TV or NTSC LPTV stations. 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.

**DELAWDER COMMUNICATIONS, INC.**

5568 General Washington Drive, Suite A-218

Alexandria, Virginia 22312

(703) 658-5390

**ENGINEERING REPORT**

---

Minnesota Valley TV Improvement Corporation  
Granite Falls, MN (Channel 33 Displacement Application)

Regarding K18DI, Granite Falls, MN, Channel 18+

9. MVTVI is also the licensee of collocated LPTV station K18DI. K18DI is licensed for an ERP of 1.67 kW (2.23 dBk), and otherwise specifies the same transmit facilities as herein proposed for K32DR. Since K18DI is located 15 channels below the proposed channel 33, a statement regarding interference is made. No interference is predicted to occur to or from K18DI by this proposal. Furthermore, K18DI may eventually be displaced from channel 18 due to another DTV station (a nearby cochannel DTV allotment has been made); and a displacement application for K18DI has been or likely will be filed by MVTVI in the near future.

Regarding K33CR, Appleton, MN, Channel 33+

10. In accordance with 47 C.F.R. Section 74.707(d)(1), a cochannel LPTV UHF station is protected to a C/I ratio that is no less than 28 dB for offset carrier frequency operation. As demonstrated by Exhibit No. 7 (that of BPTTL-19990427JD and not here), the 46 dBu (F50,10) interference contour for the proposed facility will not overlap with the 74 dBu (F50,50) service contour of K33CR. Since offset is proposed between the two cochannel stations, adequate protection to K33CR will exist.

Regarding K33CT, Olivia, MN, Channel 33-

11. In accordance with 47 C.F.R. Section 74.707(d)(1), a cochannel LPTV UHF station is protected to a C/I ratio that is no less than 28 dB for offset carrier frequency operation. As demonstrated by Exhibit No. 8 (of BPTTL-19990427JD), the 46 dBu (F50,10) interference contour for the proposed facility will not overlap with the 74 dBu (F50,50) service contour of K33CT. Since offset is proposed between the two cochannel stations, adequate protection to K33CT will exist.

**DELAUDER COMMUNICATIONS, INC.**

5568 General Washington Drive, Suite A-218

Alexandria, Virginia 22312

(703) 658-5390

**ENGINEERING REPORT**

---

Minnesota Valley TV Improvement Corporation  
Granite Falls, MN (Channel 33 Displacement Application)

Regarding KAAL, Austin, MN, DTV Channel 33 Allotment

12. No known application for DTV service has been made by KAAL; therefore, the DTV allotment facilities for KAAL are used to establish its protected service. In accordance with 47 C.F.R. Section 74.706(d)(1), a cochannel DTV UHF station is protected to a C/I ratio that is no less than 21 dB. As demonstrated by Exhibit No. 9A (of BPTTL-19990427JD), the 20 dBu (F50,10) interference contour for the proposed facility will overlap with the Grade B (F50,90 47 dBu) service contour<sup>1</sup> of the KAAL DTV-33 allotment facilities.

13. 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 V, below.) Using Longley-Rice, as demonstrated by Exhibit No. 9B (of BPTTL-19990427JD), cochannel interference to the KAAL DTV-19 facility is not predicted to result from the proposed facility.

**V. DESCRIPTION OF LONGLEY-RICE STUDIES**

14. With the support of a waiver request, 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

---

<sup>1</sup> Since KAAL's DTV allocation specifies an ERP of 1000 kW, in accordance with 47 C.F.R. Section 73.622(e)(1), this station's analog Grade B service contour is used instead of the noise-limited contour of the DTV station in determining the DTV station's service area.

**DELAWDER COMMUNICATIONS, INC.**

5568 General Washington Drive, Suite A-218

Alexandria, Virginia 22312

(703) 658-5390

**ENGINEERING REPORT**

---

Minnesota Valley TV Improvement Corporation  
Granite Falls, MN (Channel 33 Displacement Application)

broadcast analog stations and LPTV stations, respectively. Furthermore, Paragraph 145 of the FCC's *In the Matter of Advanced Television Systems and Their Impact upon the Existing Television Broadcast Service - Sixth Report and Order (FCC 97-115, released April 21, 1997)* (hereafter "DTV 6th R & O.") also allows for the use of Longley-Rice in order to demonstrate protection to DTV stations. This paragraph states, in part, that "{The FCC} will allow low power TV and TV translator applicants to make use of terrain shielding and the Longley-Rice terrain dependent propagation methods, and other established engineering techniques, such as receiving antenna modeling, to show that interference will not be caused to DTV stations". Furthermore, 47 C.F.R. Section 73.622(e) states that "within {the noise-limited} contour {of a DTV station}, service is considered available at locations where the station's signal strength, as predicted using the terrain dependent Longley-Rice point-to-point propagation model, exceeds the levels above {41 dBu for UHF}".

15. While the use of Longley-Rice for analog TV and LPTV protection specifically indicates that such use must include a waiver request, the need for a waiver request when applying Longley-Rice in order to show protection to a DTV station is not similarly mentioned in the FCC Rules or policies. If deemed necessary, a (contingent) waiver request is included as Exhibit No. A.

16. 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 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. In order to compensate for the programs inability to choose population centroids, the grid size for each study has been reduced from two kilometer spacing (the spacing used by the FCC), to one kilometer spacing. Furthermore, the study was performed

**DELAWDER COMMUNICATIONS, INC.**

5568 General Washington Drive, Suite A-218

Alexandria, Virginia 22312

(703) 658-5390

**ENGINEERING REPORT**

---

Minnesota Valley TV Improvement Corporation  
Granite Falls, MN (Channel 33 Displacement Application)

twice, with a shift of each grid by 0.5 kilometers east and south for the second computer run, in order to confidently conclude that a study which uses population centroids will also demonstrate that interference will not be predicted to result.

17. The software is limited to a study distance of 300 kilometers; therefore, in some instances, the study is truncated at 300 kilometers from the proposed transmitter site. Interference is not predicted to result beyond 300 kilometers from the proposed LPTV transmitter site. Furthermore, any contour overlap area is located completely within 300 kilometers; and, therefore, the contour overlap area is completely studied.

18. 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 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.)

19. 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. Conservatively, a desired station's threshold of reception has been reduced by five decibels for the Longley-Rice studies which support this application. The MSITE<sup>TM</sup> output exhibits of this application show the threshold of reception as the corresponding minimum allowed receive power.

20. 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. However, Exhibit No. 9B (of BPTTL-19990427JD)



**DELAWDER COMMUNICATIONS, INC.**

5568 General Washington Drive, Suite A-218

Alexandria, Virginia 22312

(703) 658-5390

**ENGINEERING REPORT**

---

Minnesota Valley TV Improvement Corporation  
Granite Falls, MN (Channel 33 Displacement Application)

graphically demonstrates that the noise-limited service area for the predicted KAAL Channel 33 DTV allotment is adequately protected using Longley-Rice. As demonstrated by Exhibit No. 9B (of BPTTL-19990427JD), all examined service points within the KAAL noise-limited contour are represented by a '■' symbol (representing C/I values greater than 21 dB); and none of the service points are represented by a 'x' symbol (representing C/I values less than 21 dB).

**DELAWDER COMMUNICATIONS, INC.**

5568 General Washington Drive, Suite A-218

Alexandria, Virginia 22312

(703) 658-5390

**ENGINEERING REPORT**

---

Minnesota Valley TV Improvement Corporation  
Granite Falls, MN (Channel 33 Displacement Application)

**EXHIBIT A - WAIVER REQUEST (PAGE 1 OF 3)**

By this application, Minnesota Valley TV Improvement Corporation (MVTVI) is seeking DTV displacement relief for LPTV station K32DR, Granite Falls, Minnesota, by proposing to migrate service from channel 32(-) to channel 33(z). At the K32DR transmitter site, MVTVI is also licensed to operate fourteen other LPTV stations; and nine of its other stations will likely also require channel displacement due to the new DTV rules. If any Granite Falls LPTV station which faces possible future displacement from its licensed channel due to DTV is unable to find an alternative channel within the newly-designated core TV spectrum (channels 2 through 51), it will face the real likelihood of being cancelled by the FCC once an affected DTV station becomes operational, or once the transition period to digital is complete.

In an effort to find replacement channels for each potentially-displaced Granite Falls LPTV station, a feasibility study was conducted for all VHF and UHF TV channels (including channels 52 through 59<sup>2</sup>). For the ten stations subject to channel displacement, ten alternative channels were found. Although an attempt was made to find alternative channels which would meet all contour protections, as required by the FCC Rules (without necessitating alternative studies due to contour overlap), certain of the ten displaced LPTV stations could not find such clearly usable alternative channels where some contour overlap is not predicted to result. This proposal involves one of those instances where contour overlap will result; therefore, one or more rule waivers are requested, as discussed below.

---

<sup>2</sup> Although these channels are not within the DTV core spectrum, they are not subject to immediate recovery (for re-allotment to other services) by the FCC.

**DELAWDER COMMUNICATIONS, INC.**

5568 General Washington Drive, Suite A-218

Alexandria, Virginia 22312

(703) 658-5390

**ENGINEERING REPORT**

---

Minnesota Valley TV Improvement Corporation  
Granite Falls, MN (Channel 33 Displacement Application)

**EXHIBIT A - WAIVER REQUEST (PAGE 2 OF 3)**

The proposed transmit facility will cause objectionable interference contour overlap to the Grade B or noise-limited service contour of the following TV station(s) or allotment(s):

CALLS or

<u>File #</u>	<u>CITY, STATE</u>	<u>SERVICE</u>	<u>STATUS</u>	<u>CHAN</u>
KAAL(TV)	Austin, MN	DTV	Allotment	33

A rule waiver of 47 C.F.R. Section 74.706(d)(1) is, therefore, respectfully requested. A rule waiver of any other rule section deemed necessary by the FCC in order to grant this application is also respectfully requested.

In support of the rule waiver(s), the application includes a Longley-Rice study to each protected station (listed above), demonstrating non-interference based on this alternative method. (Also see Section IV of Exhibit EE.) 47 C.F.R. Sections 74.705(e) and 74.707(e) specifically allow LPTV stations to use Longley-Rice in order to demonstrate protection to TV broadcast analog stations and LPTV stations, respectively. Furthermore, Paragraph 145 of the FCC's *In the Matter of Advanced Television Systems and Their Impact upon the Existing Television Broadcast Service - Sixth Report and Order (FCC 97-115, released April 21, 1997)* specifically allows for the use Longley-Rice in order to demonstrate protection to DTV stations. (Also see Section V of Exhibit EE for additional information regarding Longley-Rice and its use in this instance.)

Because MVTVI may otherwise lose the LPTV license for K32DR due to DTV, it is compelled to request the above rule waiver(s). As indicated in the previous paragraph, the FCC strongly supports the use of Longley-Rice as it has been used in this instance.

**DELAWDER COMMUNICATIONS, INC.**

5568 General Washington Drive, Suite A-218

Alexandria, Virginia 22312

(703) 658-5390

**ENGINEERING REPORT**

---

Minnesota Valley TV Improvement Corporation  
Granite Falls, MN (Channel 33 Displacement Application)

**EXHIBIT A - WAIVER REQUEST (PAGE 3 OF 3)**

The benefit to the general public derived by maintaining each LPTV license at Granite Falls is obvious. Without K32DR, Granite Falls and the immediate vicinity will lose a free TV programming source. Because interference is not predicted to exist to any protected TV, LPTV or DTV allotment or station by this application on the new TV channel, the grant of this application and operation by K32DR on the new channel will not negatively impact any TV, LPTV or DTV station.

As an LPTV station, the proposed facility will operate on a secondary basis to all main NTSC TV and DTV primary stations; and must not cause actual interference to the designated service areas of such primary stations once they become operational. Pursuant to 47 C.F.R. Sections 74.702(b) and 74.703(a), MVTVI is obligated to rectify actual interference should it occur (including actual interference caused to other LPTV or TV translator stations), and must suspend its operation until such interference can be eliminated. Grant of this application will not eliminate MVTVI's obligation to prevent actual interference pursuant to these rule sections.