

ENGINEERING STATEMENT
TECHNICAL INFORMATION IN SUPPORT OF A
DIGITAL CONSTRUCTION PERMIT FOR
AN EXISTING TELEVISION TRANSLATOR
K20HB-D, BILLINGS, MONTANA
CHANNEL 20 14.5 KW ERP DA MAX 1163 METERS RCAMSL

NOVEMBER 2006

COHEN, DIPPELL AND EVERIST, P.C.
CONSULTING ENGINEERS
RADIO AND TELEVISION
WASHINGTON, D.C.

COHEN, DIPPELL AND EVERIST, P. C.

City of Washington)
) ss
District of Columbia)

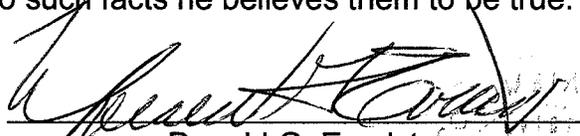
Donald G. Everist, being duly sworn upon his oath, deposes and states that:

He is a graduate electrical engineer, a Registered Professional Engineer in the District of Columbia, and is President, Secretary and Treasurer of Cohen, Dippell and Everist, P.C., Consulting Engineers, Radio - Television, with offices at 1300 L Street, N.W., Suite 1100, Washington, D.C. 20005;

That his qualifications are a matter of record in the Federal Communications Commission;

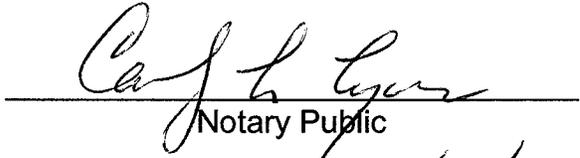
That the attached engineering report was prepared by him or under his supervision and direction and

That the facts stated herein are true of his own knowledge, except such facts as are stated to be on information and belief, and as to such facts he believes them to be true.



Donald G. Everist
District of Columbia
Professional Engineer
Registration No. 5714

Subscribed and sworn to before me this 17th day of November, 2006.


Notary Public

My Commission Expires: 2/28/2008

COHEN, DIPPELL AND EVERIST, P. C.

City of Washington)
) ss
District of Columbia)

Martin R. Doczkat being duly sworn upon his oath, deposes and states that:

He is a graduate electrical engineer of the Pennsylvania State University, and is a staff engineer at Cohen, Dippell and Everist, P.C., Consulting Engineers, Radio - Television, with offices at 1300 L Street, N.W., Suite 1100, Washington, D.C. 20005;

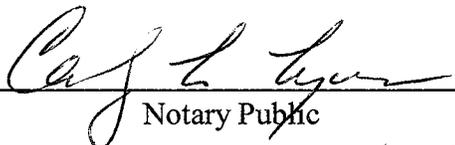
That the attached engineering report was prepared by him or under his supervision and direction and

That the facts stated herein are true of his own knowledge, except such facts as are stated to be on information and belief, and as to such facts he believes them to be true.



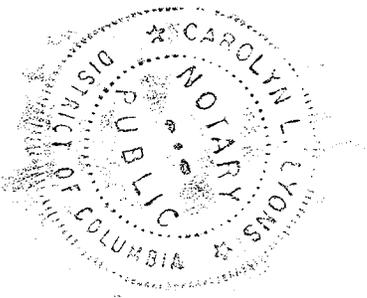
Martin R. Doczkat

Subscribed and sworn to before me this 17th day of November, 2006.



Notary Public

My Commission Expires: 2/28/2008



INTRODUCTION

This engineering statement has been prepared on behalf of Montana State University, licensee of K20HB, Billings, Montana (Facility ID #125475). This statement supports the licensee's request to convert to DTV operation on the currently licensed in-core analog Channel 20, commonly referred to as "flash-cut" with a DTV effective radiated power ("ERP") of 14.5 kW at a radiation center above mean sea level ("RCAMSL") of 1163 meters.

TRANSMITTER SITE

The licensed antenna is mounted to an existing tower where the authorized KTVQ(TV) facility is currently located. The tower is located near Coburn Road, Mile Marker 2. The tower registration number is 1001064. The geographic coordinates of the site follow below.

North Latitude: 45° 46' 00"

West Longitude: 108° 27' 27"

NAD-27

ELEVATION DATA

Elevation of site above mean sea level	1118.0 Meters 3668.0 Feet
Overall height above ground of the existing antenna structure (including appurtenances)	116.7 Meters 382.9 Feet
Overall height above mean sea level of the existing antenna structure (including appurtenances)	1234.7 Meters 4050.9 Feet
Antenna vertical height	11 Meters 35.9 Feet
Center of radiation of antenna above ground level	45 Meters 147.6 Feet

Center of radiation of antenna above mean sea level	1163.0 Meters 3815.6 Feet
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EQUIPMENT DATA

Transmission Line:	Dielectric, 50 ohm, 1-5/8", FlexLine, 76 Meters (250 Feet) with 72.5% efficiency
Emission Mask	Simple
Antenna:	Dielectric, TLP16-B directional antenna with 1° electrical beam tilt

POWER DATA

Transmitter Power Output	1.25 kW	0.969 dBk
Transmission Line Loss	72.5%	1.40 dB
Input Power to the Antenna	0.906 kW	-0.431 dBk
Antenna Power Gain, Main Lobe	16.0	12.04 dB
Effective Radiated Power, Maximum	14.5 kW	11.61 dBk

A coverage map of the proposed facility has been included as Exhibit E-1 of this report. The antenna elevation pattern and associated tabulation and the resulting horizontal pattern and accompanying tabulation should be on file at the Commission as the currently licensed directional "off-the-shelf" antenna for K20HB with no alterations has been proposed.

INTERFERENCE ANALYSIS

A study of predicted interference caused by the proposed K20HB low-power digital operation has been performed using the Longley-Rice program for which the source data has been posted by the Commission on its website at http://www.fcc.gov/oet/dtv/dtv_apps.html. The FCC's FORTRAN-77 code was modified only to the extent necessary (primarily input/output handling) for the program to run on a

Microsoft Windows XP/Intel platform. Comparison of service/interference areas and population indicates this model closely matches the FCC's digital low-power TV/translator evaluation program. Best efforts have been made to use data and calculation identical to the FCC's program. The model employs the Longley-Rice propagation methodology and evaluates in grid cells of approximately 1 sq. km. Using 3-second terrain data sampled approximately every 1.0 km at one-degree azimuth intervals with 1990 census centroids, all studies are based upon data in the current CDBS database update of the FCC's engineering database. A Longley-Rice study was performed with the proposed K20HB low-power digital facilities and all relevant stations listed in the FCC database as of November 17, 2006. The study results and the included stations are listed in Exhibit E-2.

OTHER BROADCAST FACILITIES

A brief analysis was completed to determine the presence of stations in the vicinity of the K20HB tower using data contained within The Commission's Consolidated Database System. One authorized FM radio station was found within 100 meters of the tower, one authorized NTSC translator was found within 100 meters, and a DTV and NTSC station were also found within 100 meters of the site in addition to the proposed K20HB facility. There are no AM stations within 3.22 kilometers of the proposed site. Although no adverse effects are expected due to the proposed changes to K20HB, the applicant will install filters or take other measures necessary to resolve any problems provided they are related to the changes proposed in this application.

The proposed site for K20HB is also the KTVQ(TV) site. Therefore, KTVQ(TV), licensed to operate at 100 kW ND ERP with a center of radiation of 104 meters AGL and KTVQ-DT, authorized to operate at 26.1 kW ND ERP with a center of radiation of 112.4 meters AGL are both located on the same existing tower in which K20HB is currently licensed to operate its analog facility and proposes to operate its digital facility. The FM

filing KBBB(FM) is also licensed to operate from existing KTVQ site with 100 kW ERP (horizontal and vertical polarization) at a center of radiation of 76 meters AGL. The NTSC translator, K14IS, is licensed to operate at 9.66 kW ND ERP at a center of radiation of 33 meters AGL at a site 100 meters from the proposed K20HB site.

Therefore, the radio frequency field (“RFF”) study will consider the following stations:

KTVQ(TV) (according to the license)	Channel 2
KTVQ-DT (according to the CP)	Channel 17
KBBB-FM	Channel 279
K20HB-D (proposed)	Channel 20
K14IS	Channel 14

The RF field contribution of each station will be calculated using the following formula:

$$S = \frac{33.4(F^2) \text{ Total ERP}}{R^2}$$

where:

S = power density in $\mu\text{W}/\text{cm}^2$

F = relative field factor

Total ERP = ERP Horizontal Polarization + ERP Vertical Polarization

R = RCAGL - 2 meters

ERP = RMS ERP in watts for DTV Stations

ERP = $[0.4 \text{ ERP}_V + \text{ERP}_A]$ for NTSC Stations

ERP_V = peak visual ERP in watts

ERP_A = RMS aural ERP in watts

KTVQ(TV) NTSC Facility

Channel 2 Freq: 54-60 MHz range
 ERP = 50 kW (0.4) [100 kW (visual)]+[10 kW (aural)]
 Polarization = Horizontal
 RCAGL -2 meters = 102 meters

KTVQ(TV) utilizes an antenna with a field factor less than 0.2 at any angle greater than 45 degrees below the horizon. A value of 0.2 will be used in the calculation.

$$S = \frac{33.4 (F^2) \text{ Tot ERP}}{R^2}$$

Tot ERP = 50000 watts (Horizontal Only)
 R = 102 meters
 F = 0.2 (field factor)

$$S \# 3.2 \mu\text{W}/\text{cm}^2$$

KTVQ(TV) contributes less than $3.2 \mu\text{W}/\text{cm}^2$ at 2 meters above ground. The limit for an uncontrolled environment is $200 \mu\text{W}/\text{cm}^2$ for a station broadcasting in 30-300 MHz range.

Therefore:

KTVQ(TV) facility contributes less than 1.6% RFF for an uncontrolled environment two meters above ground at the K20HB tower site.

KTVQ-DT DTV Facility

Channel 10 Freq: 192-198 MHz range
 ERP = 26.1 kW
 Polarization = Horizontal
 RCAGL -2 meters = 110.4 meters

KTVQ-DT utilizes a Dielectric, Type TF-6HT-H DC antenna with 0.5° electrical beam tilt. The manufacturer's vertical plane pattern for this antenna ensures that the field factor will be less than 0.25 at any angle greater than 20 degrees below the horizon. A value of 0.25 will be used in the calculation.

$$S = \frac{33.4 (F^2) \text{ Tot ERP}}{R^2}$$

Tot ERP = 26.1 kW (Horizontal Only)
 R = 110.4 meters
 F = 0.25 (field factor)

$$S \# 4.5 \mu\text{W}/\text{cm}^2$$

KTVQ-DT contributes less than $4.5 \mu\text{W}/\text{cm}^2$ at 2 meters above ground. The limit for an uncontrolled environment is $200 \mu\text{W}/\text{cm}^2$ for a station broadcasting in the 30-300 MHz range.

The limit for an uncontrolled environment is $f/1.5$ for a station broadcasting in the 300-1500 MHz range.

$(473 \text{ MHz})/1.5 = 315.3 \mu\text{W}/\text{cm}^2$ is the RFF limit for K14IS (TX).

Therefore:

K14IS TX facility contributes less than 2.1% RFF for an uncontrolled environment two meters above ground at the K20HB tower site.

K20HB Digital Translator Facility (Proposed)

Channel 20	Freq:	506-512 MHz range
	ERP =	14.5 kW
	Polarization =	Horizontal
	RCAGL -2 meters =	43 meters

K20HB-D proposes to utilize a Dielectric, Type TLP16-B antenna with 1.0° electrical beam tilt. The manufacturer's vertical plane pattern for the antenna indicates that the field factor will be less than 0.2 at any angle greater than 10 degrees below the horizon. A value of 0.2 will be used in the calculation.

$S = \frac{33.4 (F^2) \text{ Tot ERP}}{R^2}$	Tot ERP = 14.5 kW (Horizontal Only)
	R = 43 meters
	F = 0.2 (field factor)

$S \# 10.5 \mu\text{W}/\text{cm}^2$

K20HB (TX) contributes less than $10.5 \mu\text{W}/\text{cm}^2$ at 2 meters above ground. The limit for an uncontrolled environment is $f/1.5$ for a station broadcasting in the 300-1500 MHz range.

$(509 \text{ MHz})/1.5 = 339.3 \mu\text{W}/\text{cm}^2$ is the RFF limit for K20HB-D.

Therefore:

K20HB-D digital translator facility contributes less than 3.1% RFF for an uncontrolled environment two meters above ground at the K20HB tower site

Total RFF at Site

The total RFF contribution for all transmitters can now be calculated:

Total RFF% = 1.6% + 2.3% + 54.9% + 2.1% + 3.1% = 64%

The total RFF contribution by the existing stations and the K20HB proposed DTV operations at 2 meters above ground level is less than 64% of the current FCC guidelines for general population exposure.

Authorized personnel and rigging contractors will be alerted to the potential zone of high radiation on the tower, and if necessary, the station will operate with reduced power or terminate the operation of the transmitter as appropriate when it is necessary for authorized personnel or contractors to perform work on the tower. Workers and the general public, therefore, will not be subjected to RFF levels in excess of the current FCC guidelines.

ENVIRONMENTAL ASSESSMENT

An environmental assessment ("EA") is categorically excluded under Section 1.1306 of the FCC Rules and Regulations as the tower was constructed prior to the requirements specified in WT Docket No. 03-128 and the licensee indicates:

- (a)(1) The existing tower is not located in an officially designated wilderness area.
- (a)(2) The existing tower is not located in an officially designated wildlife preserve.
- (a)(3) The proposed facilities will not affect any listed threatened or endangered species or habitats.
- (a)(3)(ii) The proposed facilities will not jeopardize the continued existence of any proposed endangered or threatened species or likely to result in the destruction or adverse modification of proposed critical habitats.
- (a)(4) The proposed facilities located on a tower which was built prior to the adoption of WT Docket No. 03-128 and is grandfathered and has not affected any known districts, sites, buildings, structures, or objects significant in American history, architecture, archaeology, engineering, or culture.
- (a)(5) The existing tower is not located near any known Indian religious sites.
- (a)(6) The existing tower is not located in a flood plain.

- (a)(7) The installation of the DTV facilities on an existing tower will not involve a significant change in surface features of the ground in the vicinity of the tower.
- (a)(8) It is not proposed to equip the tower with high intensity white lights unless required by the FAA.
- (b) Workers and the general public will not be subjected to RFF levels in excess of the current FCC guidelines contained in OET Bulletin No. 65, Edition 97-01, dated August 1997 and Supplement A.

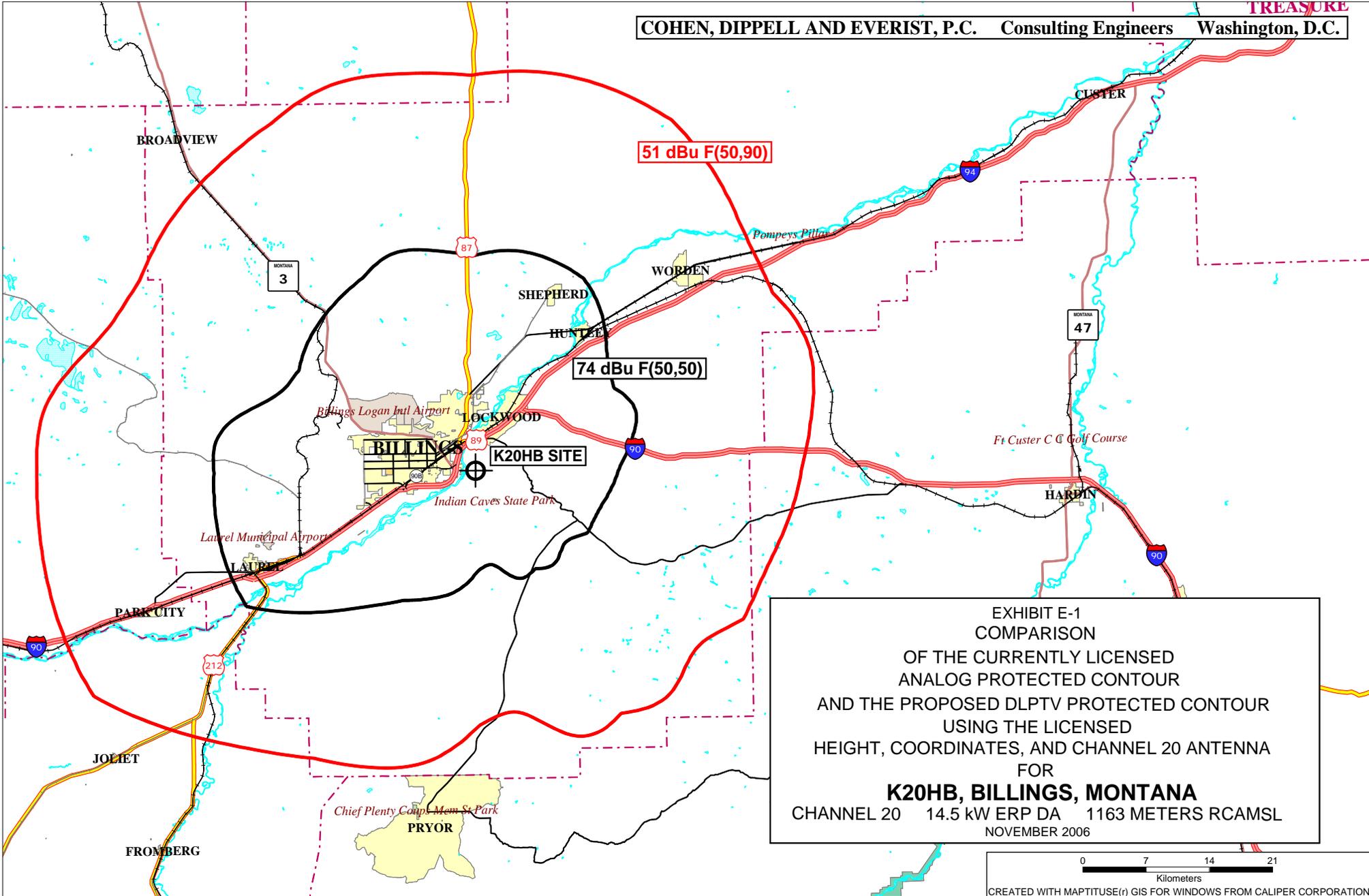


EXHIBIT E-1
 COMPARISON
 OF THE CURRENTLY LICENSED
 ANALOG PROTECTED CONTOUR
 AND THE PROPOSED DLPTV PROTECTED CONTOUR
 USING THE LICENSED
 HEIGHT, COORDINATES, AND CHANNEL 20 ANTENNA
 FOR
K20HB, BILLINGS, MONTANA
 CHANNEL 20 14.5 kW ERP DA 1163 METERS RCAMSL
 NOVEMBER 2006

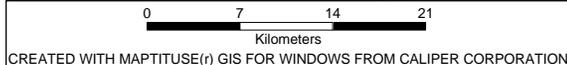


EXHIBIT E-2
DLPTV ANALYSIS RESULTS
FOR THE PROPOSED DIGITAL “FLASH-CUT”
OPERATION OF
K20HB-D, BILLINGS, MONTANA

DLPTV Results - K20HB

1990 Census data selected
TV INTERFERENCE and SPACING ANALYSIS PROGRAM

Date: 11-17-2006 Time: 16:20:17

Record Selected for Analysis

K20HB MRD -2395MRD BILLINGS MT US
 Channel 20 ERP 14.5 kW HAAT 119 m RCAMSL 1163 m
 Latitude 45 -46-0 Longitude 108 -27-27
 Status DTV Zone 2 Border DT Mask None
 Dir Antenna Make CDB Model 0000000001066 Beam tilt N Ref Azimuth 0
 Last update Cutoff date 18991231 Docket
 Comments
 Applicant

Cell Size for Service Analysis 1.0 km/side

Distance Increments for Longley-Rice Analysis 1.00 km

Not full service station

Facility meets maximum power limit

Azimuth (Deg)	ERP (kW)	HAAT (m)	51.0 dBu F(50, 90) (km)
0.0	6.335	169.3	43.6
45.0	4.853	139.8	40.3
90.0	6.032	80.9	35.7
135.0	4.971	59.1	31.5
180.0	6.126	40.5	28.1
225.0	11.524	103.3	41.8
270.0	14.500	181.5	48.6
315.0	11.693	127.2	43.9

Contour Overlap to Proposed Station

Station
NEW 19 JACKSON WY BNPTTL20000830BKS

Station inside contour of Digital LPTV station
K20HB 20 BILLINGS MT MRD 2395MRD

Station
K19FG 19 TETON VILLAGE WY BLTT20050304ABT

Station inside contour of Digital LPTV station
K20HB 20 BILLINGS MT MRD 2395MRD

Station
K20HB 20 BILLINGS MT BLTT20041123AKE

Station inside contour of Digital LPTV station
K20HB 20 BILLINGS MT MRD 2395MRD

Station
NEW 20 GLASGOW MT BNPTT20000815ADF

Station inside contour of Digital LPTV station
K20HB 20 BILLINGS MT MRD 2395MRD

Station

K20BP 20 PHILLIPS COUNTY DLPTV Results - K20HB
MT BLTT19890313IR

Station inside contour of Digital LPTV station
K20HB 20 BILLINGS MT MRD 2395MRD

Station
K21HU 21 BUTTE MT BNPTTL20000830BCV

Station inside contour of Digital LPTV station
K20HB 20 BILLINGS MT MRD 2395MRD

Station
K58GQ 21 GLENDO WY BPTT20050510ABC

Station inside contour of Digital LPTV station
K20HB 20 BILLINGS MT MRD 2395MRD

Station
NEW 21 JACKSON WY BNPTTL20000830BKT

Station inside contour of Digital LPTV station
K20HB 20 BILLINGS MT MRD 2395MRD

Contour Overlap Evaluation to Proposed Station Complete

Proposed facility OK to FCC Monitoring Stations

Proposed facility OK toward West Virginia quiet zone

Proposed facility OK toward Table Mountain

Proposed facility is within the Canadian coordination distance
Distance to border = 359.4km

Proposed facility is beyond the Mexican coordination distance

Proposed station is OK toward AM broadcast stations

Start of Interference Analysis

Channel	Proposed Station	ARN	
20	Call City/State K20HB BILLINGS MT	MRD	2395MRD

Stations Potentially Affected by Proposed Station

Chan	Call	City/State	Dist(km)	Status	Application	Ref. No.
16	K16AZ	GLASGOW MT	304.3	LIC	BLTTL	-19880401NV
16	K16DZ	HARDIN MT	71.5	LIC	BLTT	-19950515IC
19	K19CO	EMIGRANT MT	180.2	LIC	BLTT	-19911118JH
20	950306KF	IDAHO FALLS ID	354.9	CP	BPCT	-19950306KF
20	K20DY	BELGRADE, ETC. MT	218.5	LIC	BLTT	-20050505ABO
20	K20HB	BILLINGS MT	0.0	LIC	BLTT	-20041123AKE
20	NEW	GLASGOW MT	304.3	APP	BNPTT	-20000815ADF
20	NEW	LIVINGSTON, ETC. MT	163.2	APP	BSFDTL	-20060630BDX
20	K20BP	PHILLIPS COUNTY MT	241.5	LIC	BLTT	-19890313IR
20	NEW	SPEARFISH SD	389.1	APP	BDCCDTT	-20061030APU
20	KFNB	CASPER WY	377.0	LIC	BLCT	-19950928KF
21	NEW	EMIGRANT MT	180.2	APP	BSFDTT	-20060630CWX
23	K23HI	BILLINGS MT	6.4	CP	BNPTTL	-20000829AFB
23	NEW	BOZEMAN MT	202.0	APP	BNPTTL	-20000831CJY
23	NEW	SHERIDAN WY	165.0	APP	BNPTTL	-20000829AKD
24	K24FL	COLUMBUS MT	64.2	LIC	BLTT	-20040930ANI
24	K24GD	HARDIN MT	71.5	LIC	BLTTL	-20030714ABQ
24	NEW	HARDIN MT	71.5	APP	BNPTT	-20000831BTK
27	K27IM	BILLINGS MT	0.1	LIC	BLTT	-20060711ABH

DLPTV Results - K20HB

%%%

Analysis of Interference to Affected Station 1

Analysis of current record

Channel Call City/State Application Ref. No.
16 K16AZ GLASGOW MT BLTTL -19880401NV

Stations Potentially Affecting This Station

Table with 7 columns: Chan, Call, City/State, Dist(km), Status, Application, Ref. No. Rows include NEW, KTGF, and K20HB.

Proposed station is beyond the site to nearest cell evaluation distance

%%%

Analysis of Interference to Affected Station 2

Analysis of current record

Channel Call City/State Application Ref. No.
16 K16DZ HARDIN MT BLTT -199505151C

Stations Potentially Affecting This Station

Table with 7 columns: Chan, Call, City/State, Dist(km), Status, Application, Ref. No. Rows include NEW, KCTZ-DT, KTGF, K16DH, KFNE, KTVQ-DT, KSVI, and K20HB.

Proposed station is beyond the site to nearest cell evaluation distance

%%%

Analysis of Interference to Affected Station 3

Analysis of current record

Channel Call City/State Application Ref. No.
19 K19C0 EMI GRANT MT BLTT -19911118JH

Stations Potentially Affecting This Station

Table with 7 columns: Chan, Call, City/State, Dist(km), Status, Application, Ref. No. Rows include KCTZ-DT, KWB, KWB-DT, NEW, and K20HB.

Proposed station is beyond the site to nearest cell evaluation distance

DLPTV Results - K20HB

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Analysis of Interference to Affected Station 4

NTSC Baseline Analysis

Channel	Call	City/State	Application	Ref. No.
20	NEW	IDAHO FALLS ID	DTVPLN	-NPLN0455

Stations Potentially Affecting This Station

Chan	Call	City/State	Dist(km)	Status	Application	Ref. No.
17	KISU-DT	POCATELLO ID	0.2	PLN	DTVPLN	-DTVP0246
19	KBGH	FILER ID	166.0	PLN	DTVPLN	-NPLN0452
20	NEW	SALT LAKE CITY UT	318.1	PLN	DTVPLN	-NPLN1559
23	KPVI-DT	POCATELLO ID	69.4	PLN	DTVPLN	-DTVP0492
35	KXTF	TWIN FALLS ID	165.9	PLN	DTVPLN	-NPLN0478

Results for: 20N ID IDAHO FALLS DTVPLN NPLN0455 PLN

	POPULATION	AREA (sq km)
within Noise Limited Contour	221331	23275.9
not affected by terrain losses	219231	21089.7
lost to NTSC IX	10	335.1
lost to additional IX by ATV	106	19.9
lost to all IX	116	355.1

Analysis of current record

Channel	Call	City/State	Application	Ref. No.
20	950306KF	IDAHO FALLS ID	BPCT	-19950306KF

Stations Potentially Affecting This Station

Chan	Call	City/State	Dist(km)	Status	Application	Ref. No.
17	KISU-DT	POCATELLO ID	63.5	PLN	DTVPLN	-DTVP0246
17	KISU-TV	POCATELLO ID	63.6	LIC	BLEDT	-20030131AHZ
20	K20HB	BILLINGS MT	354.9	DTV	MRD	-2395MRD
20	KTMW	SALT LAKE CITY UT	346.1	CP MOD	BMPCT	-19990308KF
23	KPVI-DT	POCATELLO ID	98.6	PLN	DTVPLN	-DTVP0492
35	KXTF	TWIN FALLS ID	229.5	LIC	BLCT	-19890131KI

Proposal causes no interference

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Analysis of Interference to Affected Station 5

Analysis of current record

Channel	Call	City/State	Application	Ref. No.
20	K20DY	BELGRADE, ETC. MT	BLTT	-20050505AB0

Stations Potentially Affecting This Station

Chan	Call	City/State	Dist(km)	Status	Application	Ref. No.
16	KCTZ-DT	BOZEMAN MT	31.3	PLN	DTVPLN	-DTVP0219del
19	KWYB	BUTTE MT	99.8	CP	BPCDT	-19991101AJX
19	KWYB-DT	BUTTE MT	99.8	PLN	DTVPLN	-DTVP0343
20	950306KF	IDAHO FALLS ID	215.5	CP	BPCT	-19950306KF
20	K20HB	BILLINGS MT	218.5	DTV	MRD	-2395MRD
20	NEW	LIVINGSTON, ETC. MT	56.2	APP	BSFDTL	-20060630BDX

Proposal causes no interference

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Analysis of Interference to Affected Station 6

Analysis of current record

DLPTV Results - K20HB

Channel 20 Call K20HB City/State BILLINGS MT Application Ref. No. BLTT -20041123AKE

Stations Potentially Affecting This Station

Chan	Call	City/State	Dist(km)	Status	Application	Ref. No.
16	NEW	BILLINGS MT	0.3	APP	BNPEDT	-20060809AJ0
17	KTVQ-DT	BILLINGS MT	0.0	PLN	DTVPLN	-DTVP0257
18	KSVI	BILLINGS MT	10.1	CP	BPCDT	-19991029ACI
18	KSVI -DT	BILLINGS MT	10.1	PLN	DTVPLN	-DTVP0298
20	950306KF	IDAHO FALLS ID	354.9	CP	BPCT	-19950306KF
20	K20HB	BILLINGS MT	0.0	DTV	MRD	-2395MRD
20	KFNB	CASPER WY	377.0	LIC	BLCT	-19950928KF
22	KHMT	HARDIN MT	24.9	CP	BPCDT	-19991101AKB
22	KHMT-DT	HARDIN MT	24.9	PLN	DTVPLN	-DTVP0463

Total scenarios = 1

Result key: 1
 Scenario 1 Affected station 6
 Before Analysis

Results for: 20N MT BILLINGS BLTT 20041123AKE LIC

	POPULATION	AREA (sq km)
within Noise Limited Contour	109274	1676.6
not affected by terrain losses	108746	1494.7
lost to NTSC IX	0	0.0
lost to additional IX by ATV	337	74.3
lost to all IX	337	74.3

Potential Interfering Stations Included in above Scenario 1

17A MT BILLINGS	DTVPLN	DTVP0257	PLN
18A MT BILLINGS	BPCDT	19991029ACI	CP
18A MT BILLINGS	DTVPLN	DTVP0298	PLN
22A MT HARDIN	BPCDT	19991101AKB	CP
22A MT HARDIN	DTVPLN	DTVP0463	PLN

After Analysis

Results for: 20N MT BILLINGS BLTT 20041123AKE LIC

	POPULATION	AREA (sq km)
within Noise Limited Contour	109274	1676.6
not affected by terrain losses	108746	1494.7
lost to NTSC IX	0	0.0
lost to additional IX by ATV	107200	1362.6
lost to all IX	107200	1362.6

Potential Interfering Stations Included in above Scenario 1

17A MT BILLINGS	DTVPLN	DTVP0257	PLN
18A MT BILLINGS	BPCDT	19991029ACI	CP
18A MT BILLINGS	DTVPLN	DTVP0298	PLN
22A MT HARDIN	BPCDT	19991101AKB	CP
22A MT HARDIN	DTVPLN	DTVP0463	PLN
20A MT BILLINGS	MRD	2395MRD	DTV

The following station failed the de minimis interference criteria.

20D MT BILLINGS MRD 2395MRD
 ERP 14.50 kW HAAT 119.0 m RCAMSL 1163.0 m
 Antenna CDB 0000000001066

Due to interference to the following station and scenario: 1

20N MT BILLINGS BLTT 20041123AKE
 ERP 58.00 kW HAAT 119.0 m RCAMSL 1163.0 m
 Antenna CDB 00000000067656

Percent new DTV interference without proposal: 0.3 BLTT 20041123AKE
 Percent new DTV interference with proposal: 98.1 BLTT 20041123AKE

DLPTV Results - K20HB

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Analysis of Interference to Affected Station 7

Analysis of current record

Channel	Call	City/State	Application	Ref. No.
20	NEW	GLASGOW MT	BNPTT	-20000815ADF

Stations Potentially Affecting This Station

Chan	Call	City/State	Dist(km)	Status	Application	Ref. No.
20	K20HB	BILLINGS MT	304.3	DTV	MRD	-2395MRD
20	K20BP	PHILLIPS COUNTY MT	145.2	LIC	BLTT	-198903131R
20	KDSE-DT	DICKINSON ND	323.9	PLN	DTVPLN	-DTVP0387

Proposal causes no interference

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Analysis of Interference to Affected Station 8

Analysis of current record

Channel	Call	City/State	Application	Ref. No.
20	NEW	LIVINGSTON, ETC. MT	BSFDTL	-20060630BDX

Stations Potentially Affecting This Station

Chan	Call	City/State	Dist(km)	Status	Application	Ref. No.
20	950306KF	IDAHO FALLS ID	232.6	CP	BPCT	-19950306KF
20	K20DY	BELGRADE, ETC. MT	56.2	LIC	BLTT	-20050505ABO
20	K20HB	BILLINGS MT	163.2	DTV	MRD	-2395MRD
21	NEW	EMIGRANT MT	31.3	APP	BSFDTT	-20060630CWX

Total scenarios = 3

Result key: 2
 Scenario 1 Affected station 8
 Before Analysis

Results for: 20A MT LIVINGSTON, ETC. BSFDTL 20060630BDX APP
 HAAT 259.0 m, ATV ERP 15.0 kW

	POPULATION	AREA (sq km)
within Noise Limited Contour	53477	10049.3
not affected by terrain losses	44591	8149.9
lost to NTSC IX	3666	132.4
lost to additional IX by ATV	0	0.0
lost to ATV IX only	0	0.0
lost to all IX	3666	132.4

Potential Interfering Stations Included in above Scenario 1

20N MT BELGRADE, ETC. BLTT 20050505ABO LIC

After Analysis

Results for: 20A MT LIVINGSTON, ETC. BSFDTL 20060630BDX APP
 HAAT 259.0 m, ATV ERP 15.0 kW

	POPULATION	AREA (sq km)
within Noise Limited Contour	53477	10049.3
not affected by terrain losses	44591	8149.9
lost to NTSC IX	3666	132.4
lost to additional IX by ATV	66	33.4
lost to ATV IX only	66	42.2
lost to all IX	3732	165.8

DLPTV Results - K20HB

Potential Interfering Stations Included in above Scenario 1

20N MT BELGRADE, ETC. BLTT 20050505ABO LIC
 20A MT BILLINGS MRD 2395MRD DTV

Result key: 3
 Scenario 2 Affected station 8
 Before Analysis

Results for: 20A MT LIVINGSTON, ETC. BSFDTL 20060630BDX APP
 HAAT 259.0 m, ATV ERP 15.0 kW

	POPULATION	AREA (sq km)
within Noise Limited Contour	53477	10049.3
not affected by terrain losses	44591	8149.9
lost to NTSC IX	3666	132.4
lost to additional IX by ATV	11	93.2
lost to ATV IX only	11	93.2
lost to all IX	3677	225.7

Potential Interfering Stations Included in above Scenario 2

20N MT BELGRADE, ETC. BLTT 20050505ABO LIC
 21A MT EMI GRANT BSFDTL 20060630CWX APP

After Analysis

Results for: 20A MT LIVINGSTON, ETC. BSFDTL 20060630BDX APP
 HAAT 259.0 m, ATV ERP 15.0 kW

	POPULATION	AREA (sq km)
within Noise Limited Contour	53477	10049.3
not affected by terrain losses	44591	8149.9
lost to NTSC IX	3666	132.4
lost to additional IX by ATV	77	124.6
lost to ATV IX only	77	133.4
lost to all IX	3743	257.0

Potential Interfering Stations Included in above Scenario 2

20N MT BELGRADE, ETC. BLTT 20050505ABO LIC
 21A MT EMI GRANT BSFDTL 20060630CWX APP
 20A MT BILLINGS MRD 2395MRD DTV

Result key: 4
 Scenario 3 Affected station 8
 Before Analysis

Results for: 20A MT LIVINGSTON, ETC. BSFDTL 20060630BDX APP
 HAAT 259.0 m, ATV ERP 15.0 kW

	POPULATION	AREA (sq km)
within Noise Limited Contour	53477	10049.3
not affected by terrain losses	44591	8149.9
lost to NTSC IX	3666	132.4
lost to additional IX by ATV	0	0.0
lost to ATV IX only	0	0.0
lost to all IX	3666	132.4

Potential Interfering Stations Included in above Scenario 3

20N MT BELGRADE, ETC. BLTT 20050505ABO LIC

After Analysis

Results for: 20A MT LIVINGSTON, ETC. BSFDTL 20060630BDX APP
 HAAT 259.0 m, ATV ERP 15.0 kW

	POPULATION	AREA (sq km)
within Noise Limited Contour	53477	10049.3
not affected by terrain losses	44591	8149.9
lost to NTSC IX	3666	132.4
lost to additional IX by ATV	66	33.4

DLPTV Results - K20HB
 lost to ATV IX only 66 42.2
 lost to all IX 3732 165.8

Potential Interfering Stations Included in above Scenario 3

20N MT BELGRADE, ETC. BLTT 20050505ABO LIC
 20A MT BILLINGS MRD 2395MRD DTV

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Analysis of Interference to Affected Station 9

Analysis of current record

Channel Call City/State Application Ref. No.
 20 K20BP PHILLIPS COUNTY MT BLTT -198903131R

Stations Potentially Affecting This Station

Chan Call City/State Dist(km) Status Application Ref. No.
 20 K20HB BILLINGS MT 241.5 DTV MRD -2395MRD
 Proposal causes no interference

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Analysis of Interference to Affected Station 10

Analysis of current record

Channel Call City/State Application Ref. No.
 20 NEW SPEARFISH SD BDCDDT -20061030APU

Stations Potentially Affecting This Station

Chan Call City/State Dist(km) Status Application Ref. No.
 20 K20HB BILLINGS MT 389.1 DTV MRD -2395MRD
 20 KDSE-DT DICKINSON ND 258.3 PLN DTVPLN -DTVP0387
 20 KDUH-DT SCOTTSBLUFF NE 262.4 PLN DTVPLN -DTVP0390del
 20 KFNB CASPER WY 278.2 LIC BLCT -19950928KF
 21 KNBN RAPID CITY SD 64.5 LIC BLCT -20011031ABP

Proposed station is beyond the site to nearest cell evaluation distance

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Analysis of Interference to Affected Station 11

NTSC Baseline Analysis

Channel Call City/State Application Ref. No.
 20 KFNB CASPER WY DTVPLN -NPLN1734

Stations Potentially Affecting This Station

Chan Call City/State Dist(km) Status Application Ref. No.
 17 KTWO-DT CASPER WY 2.3 PLN DTVPLN -DTVP0276
 18 KFNB-DT CASPER WY 0.0 PLN DTVPLN -DTVP0319
 20 KTVD DENVER CO 353.4 PLN DTVPLN -NPLN0238
 20 KDUH-DT SCOTTSBLUFF NE 260.1 PLN DTVPLN -DTVP0390del

Results for: 20N WY CASPER DTVPLN NPLN1734 PLN
 POPULATION AREA (sq km)
 within Noise Limited Contour 63620 10694.5
 not affected by terrain losses 63283 9064.3
 lost to NTSC IX 0 0.0
 lost to additional IX by ATV 16 263.8

DLPTV Results - K20HB
16 263.8

Lost to all IX

Analysis of current record

Channel Call City/State Application Ref. No.
20 KFNB CASPER WY BLCT -19950928KF

Stations Potentially Affecting This Station

Chan	Call	City/State	Dist(km)	Status	Application Ref. No.
17	KTWO-DT	CASPER WY	2.3	PLN	DTVPLN -DTVPO276
17	KTWO-TV	CASPER WY	2.3	CP	BPCDT -19991028ABB
18	KFNB	CASPER WY	0.0	CP	BPCDT -20000110AAG
18	KFNB-DT	CASPER WY	0.0	PLN	DTVPLN -DTVPO319
20	KTVD	DENVER CO	346.7	CP	BPCT -20020813ABA
20	K20HB	BILLINGS MT	377.0	DTV	MRD -2395MRD
20	KDUH-DT	SCOTTSBLUFF NE	260.1	PLN	DTVPLN -DTVPO390del

Proposal causes no interference

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Analysis of Interference to Affected Station 12

Analysis of current record

Channel Call City/State Application Ref. No.
21 NEW EMIGRANT MT BSFDTT -20060630CWX

Stations Potentially Affecting This Station

Chan	Call	City/State	Dist(km)	Status	Application Ref. No.
20	K20HB	BILLINGS MT	180.2	DTV	MRD -2395MRD
21	NEW	GREAT FALLS MT	248.8	APP	BNPEDT -20060809AJP
21	KSGW-DT	SHERIDAN WY	291.9	PLN	DTVPLN -DTVPO441del

Proposed station is beyond the site to nearest cell evaluation distance

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Analysis of Interference to Affected Station 13

Analysis of current record

Channel Call City/State Application Ref. No.
23 K23HI BILLINGS MT BNPTTL -20000829AFB

Stations Potentially Affecting This Station

Chan	Call	City/State	Dist(km)	Status	Application Ref. No.
16	NEW	BILLINGS MT	6.6	APP	BNPEDT -20060809AJ0
20	K20HB	BILLINGS MT	6.4	DTV	MRD -2395MRD
22	KHMT	HARDIN MT	20.0	CP	BPCDT -19991101AKB
22	KHMT-DT	HARDIN MT	20.0	PLN	DTVPLN -DTVPO463

Proposal causes no interference

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Analysis of Interference to Affected Station 14

Analysis of current record

Channel Call City/State Application Ref. No.
23 NEW BOZEMAN MT BNPTTL -20000831CJY

Stations Potentially Affecting This Station

Chan	Call	City/State	Dist(km)	Status	Application Ref. No.
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DLPTV Results - K20HB

15	KXLF-DT	BUTTE MT	114.1	PLN	DTVPLN	-DTVP0167
16	KCTZ-DT	BOZEMAN MT	14.8	PLN	DTVPLN	-DTVP0219del
19	KWYB	BUTTE MT	114.0	CP	BPCDT	-19991101AJX
19	KWYB-DT	BUTTE MT	114.0	PLN	DTVPLN	-DTVP0343
20	K20HB	BILLINGS MT	202.0	DTV	MRD	-2395MRD
23	KPVI -DT	POCATELLO ID	321.2	PLN	DTVPLN	-DTVP0492
23	NEW	BOZEMAN MT	4.9	APP	BDCCDTT	-20061030AIF
24	KBTZ	BUTTE MT	114.0	LIC	BLCT	-20030502ABB

Proposed station is beyond the site to nearest cell evaluation distance

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Analysis of Interference to Affected Station 15

Analysis of current record

Channel	Call	City/State	Application	Ref. No.
23	NEW	SHERIDAN WY	BNPTTL	-20000829AKD

Stations Potentially Affecting This Station

Chan	Call	City/State	Dist(km)	Status	Application	Ref. No.
20	K20HB	BILLINGS MT	165.0	DTV	MRD	-2395MRD
21	KSGW-DT	SHERIDAN WY	0.0	PLN	DTVPLN	-DTVP0441del
24	NEW	SHERIDAN WY	15.2	APP	BNPTTL	-20000828BAH
24	NEW	SHERIDAN WY	25.7	APP	BNPTTL	-20000817AFE
24	NEW	SHERIDAN WY	15.2	APP	BNPTTL	-20000828AGW

Proposed station is beyond the site to nearest cell evaluation distance

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Analysis of Interference to Affected Station 16

Analysis of current record

Channel	Call	City/State	Application	Ref. No.
24	K24FL	COLUMBUS MT	BLTT	-20040930ANI

Stations Potentially Affecting This Station

Chan	Call	City/State	Dist(km)	Status	Application	Ref. No.
16	NEW	BILLINGS MT	64.3	APP	BNPEDT	-20060809AJ0
16	KCTZ-DT	BOZEMAN MT	125.0	PLN	DTVPLN	-DTVP0219del
17	KTVQ-DT	BILLINGS MT	64.2	PLN	DTVPLN	-DTVP0257
20	K20HB	BILLINGS MT	64.2	DTV	MRD	-2395MRD
22	KHMT	HARDIN MT	88.0	CP	BPCDT	-19991101AKB
22	KHMT-DT	HARDIN MT	88.0	PLN	DTVPLN	-DTVP0463
24	KBTZ	BUTTE MT	250.0	LIC	BLCT	-20030502ABB

Proposed station is beyond the site to nearest cell evaluation distance

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Analysis of Interference to Affected Station 17

Analysis of current record

Channel	Call	City/State	Application	Ref. No.
24	K24GD	HARDIN MT	BLTTL	-20030714AB0

Stations Potentially Affecting This Station

DLPTV Results - K20HB

Chan	Call	City/State	Dist(km)	Status	Application Ref. No.
16	NEW	BILLINGS MT	71.5	APP	BNPEDT -20060809AJ0
17	KTVQ-DT	BILLINGS MT	71.5	PLN	DTVPLN -DTVPO257
20	K20HB	BILLINGS MT	71.5	DTV	MRD -2395MRD
21	KSGW-DT	SHERIDAN WY	129.0	PLN	DTVPLN -DTVPO441del
22	KHMT	HARDIN MT	46.8	CP	BPCDT -19991101AKB
22	KHMT-DT	HARDIN MT	46.8	PLN	DTVPLN -DTVPO463
24	KBTZ	BUTTE MT	380.7	LIC	BLCT -20030502ABB
24	NEW	HARDIN MT	0.2	APP	BNPTT -20000831BTK
24	NEW	SHERIDAN WY	118.0	APP	BNPTTL -20000817AFE

Proposed station is beyond the site to nearest cell evaluation distance

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Analysis of Interference to Affected Station 18

Analysis of current record

Channel	Call	City/State	Application Ref. No.
24	NEW	HARDIN MT	BNPTT -20000831BTK

Stations Potentially Affecting This Station

Chan	Call	City/State	Dist(km)	Status	Application Ref. No.
16	NEW	BILLINGS MT	71.5	APP	BNPEDT -20060809AJ0
17	KTVQ-DT	BILLINGS MT	71.5	PLN	DTVPLN -DTVPO257
20	K20HB	BILLINGS MT	71.5	DTV	MRD -2395MRD
21	KSGW-DT	SHERIDAN WY	129.1	PLN	DTVPLN -DTVPO441del
22	KHMT	HARDIN MT	46.7	CP	BPCDT -19991101AKB
22	KHMT-DT	HARDIN MT	46.8	PLN	DTVPLN -DTVPO463
24	KBTZ	BUTTE MT	380.7	LIC	BLCT -20030502ABB
24	K24GD	HARDIN MT	0.2	LIC	BLTTL -20030714ABQ
24	NEW	SHERIDAN WY	135.1	APP	BNPTTL -20000828BAH
24	NEW	SHERIDAN WY	118.1	APP	BNPTTL -20000817AFE
24	NEW	SHERIDAN WY	135.1	APP	BNPTTL -20000828AGW

Proposed station is beyond the site to nearest cell evaluation distance

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Analysis of Interference to Affected Station 19

Analysis of current record

Channel	Call	City/State	Application Ref. No.
27	K27IM	BILLINGS MT	BLTT -20060711ABH

Stations Potentially Affecting This Station

Chan	Call	City/State	Dist(km)	Status	Application Ref. No.
20	K20HB	BILLINGS MT	0.1	DTV	MRD -2395MRD
27	K27HQ	CODY WY	151.6	CP	BNPTTL -20000831BKA

Proposal causes no interference

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Analysis of Interference to Affected Station 20

Analysis of current record

Channel	Call	City/State	Application Ref. No.
20	K20HB	BILLINGS MT	MRD -2395MRD

Stations Potentially Affecting This Station

DLPTV Results - K20HB

Chan	Call	City/State	Dist(km)	Status	Application	Ref. No.
20	950306KF	IDAHO FALLS ID	354.9	CP	BPCT	-19950306KF
20	K20HB	BILLINGS MT	0.0	LIC	BLTT	-20041123AKE
20	NEW	LIVINGSTON, ETC. MT	163.2	APP	BSFDTL	-20060630BDX
20	KFNB	CASPER WY	377.0	LIC	BLCT	-19950928KF

Total scenarios = 1

Result key: 5
 Scenario 1 Affected station 20
 Before Analysis

Results for: 20A MT BILLINGS MRD 2395MRD DTV

	POPULATION	AREA (sq km)
HAAT 119.0 m, ATV ERP 14.5 kW		
within Noise Limited Contour	114748	5478.9
not affected by terrain losses	114700	5286.2
lost to NTSC IX	113652	4765.9
lost to additional IX by ATV	0	0.0
lost to ATV IX only	0	0.0
lost to all IX	113652	4765.9

Potential Interfering Stations Included in above Scenario 1

20N MT BILLINGS BLTT 20041123AKE LIC

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FINISHED FINISHED FINISHED FINISHED FINISHED FINISHED

Section III - Engineering (Digital)

TECHNICAL SPECIFICATIONS

Ensure that the specifications below are accurate. Contradicting data found elsewhere in this application will be disregarded. All items must be completed. The response "on file" is not acceptable.

TECH BOX

- 1. Channel: _____
- 2. Translator Input Channel No. _____
- 3. Station proposed to be rebroadcast:

Call Sign	City	State	Channel
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- 4. Antenna Location Coordinates: (NAD 27)
_____ ° _____ ' _____ " N S Latitude
_____ ° _____ ' _____ " E W Longitude

- 5. Antenna Structure Registration Number: _____
 Not applicable See Explanation in Exhibit No. FAA Notification Filed with FAA

- 6. Antenna Location Site Elevation Above Mean Sea Level: _____ meters
- 7. Overall Tower Height Above Ground Level: _____ meters
- 8. Height of Radiation Center Above Ground Level: _____ meters
- 9. Maximum Effective Radiated Power (ERP): _____ kW
- 10. Transmitter Output Power: _____ kW

- 11. a. Transmitting Antenna: Nondirectional Directional Directional composite

Manufacturer	Model
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- b. Electrical Beam Tilt: _____ degrees Not applicable

c. Directional Antenna Relative Field Values:

Rotation: _____ ° No rotation N/A (Nondirectional)

Degree	Value	Degree	Value	Degree	Value	Degree	Value	Degree	Value	Degree	Value
0		60		120		180		240		300	
10		70		130		190		250		310	
20		80		140		200		260		320	
30		90		150		210		270		330	
40		100		160		220		280		340	
50		110		170		230		290		350	
Additional Azimuths											

NOTE: In addition to the information called for in this section, an explanatory exhibit providing full particulars must be submitted for each question for which a "No" response is provided.

12. **Out-of-Channel Emission Mask:** Simple Stringent

CERTIFICATION

13. **Interference.** The proposed facility complies with all of the following applicable rule sections. 47 C.F.R. Sections 74.709, 74.793(e), 74.793(f), 74.793(g), 74.793(h), 74.794(b) and 73.1030. Yes No See Explanation in Exhibit No.

14. **Environmental Protection Act.** The proposed facility is excluded from environmental processing under 47 C.F.R. Section 1.1306 (*i.e.*, the facility will not have a significant environmental impact and complies with the maximum permissible radiofrequency electromagnetic exposure limits for controlled and uncontrolled environments). Unless the applicant can determine RF compliance. An **Exhibit is required.** Yes No See Explanation in Exhibit No.

Exhibit No.

By checking "Yes" above, the applicant also certifies that it, in coordination with other users of the site, will reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency electromagnetic exposure in excess of FCC guidelines.

15. **Channels 52-59.** If the proposed channel is within channels 52-59, the applicant certifies compliance with the following requirements, as applicable:

The applicant is applying for a digital companion channel for which no suitable channel from channel 2-51 is available.

Pursuant to Section 74.786(d), the applicant has notified, within 30 days of filing this application, all commercial wireless licensees of the spectrum comprising the proposed TV channel and the first adjacent channels thereto, for which the proposed digital LPTV or TV translator antenna site lies inside the licensed geographic boundaries of the wireless licensees or within 75 miles and 50 miles, respectively, of the geographic boundaries of co-channel and adjacent-channel wireless licensees.

PREPARER'S CERTIFICATION ON PAGE 8 MUST BE COMPLETED AND SIGNED.

16. **Channels 60-69.** If the proposed channel is within channels 60-69, the applicant certifies compliance with the following requirements, as applicable:

- Pursuant to Section 74.786(e), the applicant has notified, within 30 days of filing this application, all commercial wireless licensees of the spectrum comprising the proposed TV channel and the first adjacent channels thereto, for which the proposed digital LPTV or TV translator antenna site lies inside the licensed geographic boundaries of the wireless licensees or within 75 miles and 50 miles, respectively, of the geographic boundaries of co-channel and adjacent-channel wireless licensees,
- Pursuant to Section 74.786(e), the applicant proposing operation on channel 63, 64, 68 and 69 ("public safety channels") has secured a coordinated spectrum use agreement(s) with 700 MHz public safety regional planning committee(s) and state frequency administrator(s) of the region(s) and state(s) within which the antenna site of the digital LPTV or TV translator station is proposed to locate, and those adjoining regions and states with boundaries within 75 miles of the proposed station location.
- Pursuant to Section 74.786(e), an applicant for a channel adjacent to channel 63, 64, 68 or 69 has notified, within 30 days of filing this application, the 700 MHz public safety regional planning committee(s) and state administrator(s) of the region and state containing the proposed digital LPTV or TV translator antenna site and regions and states whose geographic boundaries lie within 50 miles of the proposed LPTV or TV translator antenna site.

I certify that I have prepared Section III (Engineering Data) on behalf of the applicant, and that after such preparation, I have examined and found it to be accurate and true to the best of my knowledge and belief.

Name Martin R. Doczkat		Relationship to Applicant (e.g., Consulting Engineer) Consulting Engineer	
Signature 		Date November 17, 2006	
Mailing Address Cohen, Dippell and Everist, P.C., 1300 L Street, NW, Suite 1100			
City Washington		State or Country (if foreign address) DC	ZIP Code 20005
Telephone Number (include area code) (202) 898-0111		E-Mail Address (if available) cde@attglobal.net	

WILLFUL FALSE STATEMENTS ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. CODE, TITLE 18, SECTION 1001), AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION PERMIT (U.S. CODE, TITLE 47, SECTION 312(a)(1)), AND/OR FORFEITURE (U.S. CODE, TITLE 47, SECTION 503).