

TECHNICAL EXHIBIT  
APPLICATION FOR CONSTRUCTION PERMIT  
BROADCAST STATION KGNU-FM  
BOULDER, COLORADO  
CH 203A 4 KW (MAX-DA) 65 M

April 7, 2008

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Technical Statement

This Technical Exhibit was prepared in support of an application for construction permit for a minor modification to non-commercial educational FM (NCE-FM) station KGNU-FM, Boulder, Colorado, on Channel 203A (See FCC File No. BLED-1807). The facility was designed to comply with the allocation requirements of Sections 73.509 and 73.525 the FCC Rules. The instant proposal is classified as a minor change. See Figure 1 for 60 dBu coverage contour comparison.

Proposed Facility

The proposed facility will employ a circularly polarized directional antenna with a maximum effective radiated power (ERP) of 4 kW. The antenna is to be side-mounted on its existing tower located near Louisville, Colorado.

The existing antenna supporting structure is not registered with the FCC since it is less than 61 m in height and it meets the airspace surface requirements to all nearby landing areas as per the FCC 'TOWAIR' analysis program. It is noted that the tower coordinates and site elevation have been corrected to reflect the actual location of the KGNU-FM existing tower supporting structure. This tower is also employed by numerous other non-broadcast facilities largely related to mobile telecommunications services.

The overall structure height is 46 m above ground. The antenna radiation center will be located 30 m above the ground. The site elevation is 1702 m AMSL. The antenna radiation center is located 1732 m above mean sea level and 65 m height above average terrain (HAAT). The maximum antenna HAAT in any direction is 191 m. See Figure 6 for a graph and tabulation of the proposed directional antenna pattern envelope.

#### Protection of the Table Mountain Receiving Zone

Per Section 73.1030, protection of the Table Mountain Receiving Zone has been considered as part of the instant proposal. As illustrated in Figure 1, the Table Mountain Receiving Zone is located over the azimuths 330° to 340° true from the KGNU-FM facility. KGNU-FM is licensed for operation with a non-directional ERP of 1.3 kW. The proposed directional antenna pattern envelope maintains an ERP of not greater than 0.57 relative field, or 1.3 kW, over these azimuths in order to meet the contour overlap requirements to an application for Estes Park, Colorado. Therefore, the instant proposal will result in no increase in the ERP toward the Table Mountain Receiving Zone.

#### Human Exposure to Radio Frequency Energy

The proposal complies with the FCC Rules concerning human exposure to radio frequency (RF) energy. The proposal will not exceed 43% of the RF exposure limit for general population/uncontrolled environments for the frequency proposed at accessible areas on the ground. The calculation of RF energy at 2-m above ground was

made under the procedures of OET Bulletin No. 65.\* The formula employed by the model is as follows:

$$S = \frac{(33.4)F^2P}{R^2}$$

where, S = power density in  $\mu\text{W}/\text{cm}^2$ , F = relative field factor at the angle to the calculation point, P = the total effective radiated power relative to a dipole in watts, and R = distance from the antenna radiation center to the calculation point in meters. Based on the conservative assumption of a relative field factor of 0.5, and an antenna radiation center height above ground of 30 m, the calculated power density will not exceed  $85.2 \mu\text{W}/\text{cm}^2$ . Therefore, the calculated RF exposure at 2 m above ground will not exceed 43% of the limit of  $200 \mu\text{W}/\text{cm}^2$  for general population / uncontrolled environments.

There are no other broadcast facilities located at the KGNU-FM transmitter site. The transmitter site shall be restricted from access. In the event that personnel are required to climb the tower structure, the station transmissions shall be reduced or terminated as necessary to prevent RF exposure above the FCC recommended limits.

#### Predicted Coverage Contours

The predicted 60 dBu contours were calculated in accordance with Section 73.313 of the FCC Rules. The average terrain elevations from 3 to 16 km were computed using the N.G.D.C. 30-second terrain database. The overall antenna HAAT was determined according to the provisions of Section 73.313 of the FCC Rules. The antenna radiation center HAAT in each radial direction and the ERP were used in conjunction

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\* See *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields*, Federal Communications Commission, OET Bulletin No. 65, Edition 97-01 (August 1997).

with the propagation prediction curves of Section 73.333 to determine the distances to contours.

Figure 1 is a map showing the predicted 60 dBu contour for both the licensed and proposed facility. As indicated therein, the proposed facility will provide 60 dBu coverage over the entire city limits of Boulder. It is noted that the proposal will result in an increase in 60 dBu coverage over Boulder from 89.9% to 100%. This is a substantial public interest benefit of the instant proposal.

#### Allocation Study

Figure 2 summarizes the allocation study for the proposed facility. It is noted that the proposal meets the separation requirements to all IF-related facilities. The tabulation at Figure 2 lists the results of a numerical analysis of the potential for contour overlap for all nearby co-channel and first-, second-, and third-adjacent-channel facilities. For the purposes of the numerical study, the maximum HAAT and ERP values were used in calculating the maximum distance to the predicted service and interfering contours for the proposed station and the stations under study.

Figures 3, 4 and 5 are depictions of the predicted protected and interfering contours of those stations close enough to warrant further study. This is based on the numerical analysis in Figure 2, where there is an indication of the potential for prohibited overlapping contours. As indicated in Figures 2, 3, 4 and 5, the allocation requirements for the proposed facility are fully met with respect to all pertinent facilities, with the exception of KFDN(FM), Lakewood, CO.

In the case of KFDN(FM), it was granted a construction permit (BPED-20070507AFA) and a subsequent license (BLED-20071113AFB) that permitted it to receive overlap from KGNU-FM for the first time. The FCC granted the KFDN(FM) facility with the specific condition that:

“Further modifications of the KGNU-FM (Facility Id# 6512), Boulder, CO, will not be construed as a per se modification of KFDN’s construction permit (BPED-20070507AFA). (See Educational Information Corporation, 6 FCC Rcd. 2207 (1991)).”

Based on this, it is understood that the KGNU-FM facility may be modified notwithstanding the overlap with respect to the KFDN(FM) facility, which was created by that station. Therefore, considering the public interest benefits of this proposal, the application requests a waiver to the extent necessary to permit grant of its facility notwithstanding the contour overlap with respect to the KFDN(FM) facility.<sup>†</sup>

Channel 6 Interference Analysis

The licensee of KRMA-TV, Channel 6, in Denver, Colorado, has given its consent to the instant proposal. Its letter of consent is attached with the instant application for construction permit.



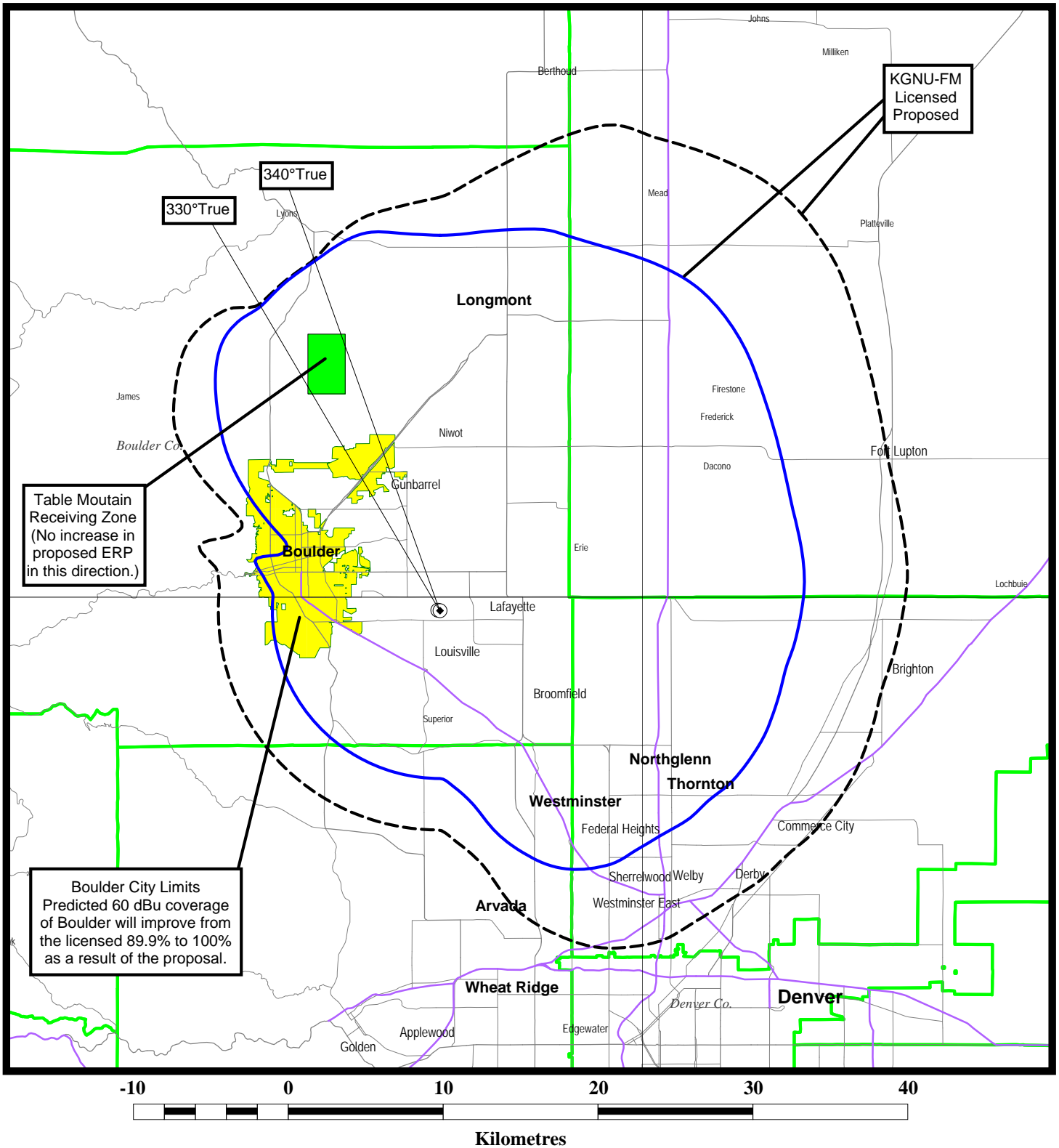
Louis R. du Treil, Jr.

du Treil, Lundin & Rackley, Inc.  
201 Fletcher Ave.  
Sarasota, FL 34237-6019

April 7, 2008

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<sup>†</sup> (The proposed facility has predicted contour overlap with an application filed for Wagon Mound, New Mexico. The incorrect coordinates were specified in the Wagon Mound application and an amendment is pending to correct the coordinates. The correct Wagon Mound transmitter site is located 333 km (207 miles) south of the incorrect coordinates indicated in the Wagon Mound application. Therefore, Wagon Mound application with the correct coordinates will have no allocation effect on the instant proposal. It is presumed that the Wagon Mound application will either be dismissed or corrected, which in either case will resolve any contour overlap issue with the instant proposal.)



## PREDICTED 60 DBU COVERAGE CONTOURS

duTreil, Lundin & Rackley, Inc. Sarasota, Florida



Call Id	City St	Status	File Num	Channel Freq	ERP HAAT	DA Id	Latitude Longitude	73 215	Bear	Dist. (km)	Req. (km)
KFDN 83535	LAKEWOOD CO	BLIC C	20071113AF	201 C3 88.1	1.200 653	N	39-40-18 105-13-05	N	188.7	36.04	51.4
KFDN 60.0 dBu Desired = 48.3 km ; Proposed 100. dbu; Undesired = 3.1											
Proposed 60.0 dBu Desired = 34.8 km ; KFDN 100. dbu; Undesired = 2.3											
(Contour overlap requirements are met. See Figure 3.)											
NEW 175283	IDAHO CO	SPRIN APP C	20071018AB	202 A 88.3	0.140 356	Y	39-44-26 105-32-21	N	229.7	43.20	73.1
NEW 60.0 dBu Desired = 21.3 km ; Proposed 54.0 dbu; Undesired = 51.9											
Proposed 60.0 dBu Desired = 34.8 km ; NEW 54.0 dbu; Undesired = 31.8											
(Contour overlap requirements are met. See Figure 4.)											
NEW 172792	IDAHO CO	SPRIN APP C	20071019AI	202 A 88.3	2.000 311	Y	39-43-56 105-40-38	N	237.2	53.26	90.5
NEW 60.0 dBu Desired = 37.2 km ; Proposed 54.0 dbu; Undesired = 51.9											
Proposed 60.0 dBu Desired = 34.8 km ; NEW 54.0 dbu; Undesired = 55.7											
(Contour overlap requirements are met. See Figure 4.)											
NEW 175799	WINTER CO	PARK APP C	20071018BD	202 C3 88.3	10.000 155	Y	40-00-23 105-47-38	N	271.8	54.63	92.6
NEW 60.0 dBu Desired = 38.8 km ; Proposed 54.0 dbu; Undesired = 51.9											
Proposed 60.0 dBu Desired = 34.8 km ; NEW 54.0 dbu; Undesired = 57.8											
(Contour overlap requirements are met. See Figure 4.)											
NEW 174839	FRASER CO	BNPED APP C	20071017AH	202 A 88.3	1.000 70	N	39-57-23 105-50-22	N	266.3	58.66	67.1
NEW 60.0 dBu Desired = 15.2 km ; Proposed 54.0 dbu; Undesired = 51.9											
Proposed 60.0 dBu Desired = 34.8 km ; NEW 54.0 dbu; Undesired = 22.7											
(Contour overlap requirements are met. See Figure 4.)											
NEW 174815	PINE CO	BNPED APP C	20071022AZ	202 A 88.3	0.100 21.3	N	39-24-56 105-19-40	N	193.1	65.76	57.5
NEW 60.0 dBu Desired = 5.6 km ; Proposed 54.0 dbu; Undesired = 51.9											
Proposed 60.0 dBu Desired = 34.8 km ; NEW 54.0 dbu; Undesired = 8.0											
(Contour overlap requirements are met. See Figure 4.)											

Allocation Study Tabulation (continued)

KLHV	FORT COLLIN	LED	202	A	0.150	N	40-37-03	N	348.1	70.95	84.1
84102	CO LIC	C	20060117AF	88.3	740		105-19-40			-13.18	Short
KLHV 60.0 dBu Desired = 31.8 km ; Proposed 54.0 dbu; Undesired = 51.9											
Proposed 60.0 dBu Desired = 34.8 km ; KLHV 54.0 dbu; Undesired = 49.3											
(Contour overlap requirements are met. See Figure 4.)											
NEW	STRASBURG	BNPED	202	A	0.500	N	39-42-31	N	111.4	85.70	64.5
175606	CO APP	C	20071022AG	88.3	68		104-13-24			21.15	Clear
NEW 60.0 dBu Desired = 12.7 km ; Proposed 54.0 dbu; Undesired = 51.9											
Proposed 60.0 dBu Desired = 34.8 km ; NEW 54.0 dbu; Undesired = 18.7											
NEW	FORT MORGAN	BNPED	202	C1	11.000	Y	39-55-22	Y	94.0	101.35	116.7
175107	CO APP	C	20071019BC	88.3	371 84094		103-58-18			-15.35	Short
NEW 60.0 dBu Desired = 55.5 km ; Proposed 54.0 dbu; Undesired = 51.9											
Proposed 60.0 dBu Desired = 34.8 km ; NEW 54.0 dbu; Undesired = 81.9											
(Contour overlap requirements are met. See Figure 4.)											
NEW	FORT MORGAN	BNPED	202	A	1.500	N	40-25-14	N	67.6	127.86	79.7
172513	CO APP	C	20071018AS	88.3	195		103-45-37			48.17	Clear
NEW 60.0 dBu Desired = 27.8 km ; Proposed 54.0 dbu; Undesired = 51.9											
Proposed 60.0 dBu Desired = 34.8 km ; NEW 54.0 dbu; Undesired = 41.9NEW											
KGNU-FMBOULDER		LED	203	A	1.300	N	39-59-32	N	102.3	0.15	
6512	CO LIC	C	1807	88.5	190		105-09-10				
(This is the KGNU-FM licensed facility record.)											
NEW	SANTA MARIA	BNPED	203	A	0.500	Y	39-27-54	N	217.4	73.65	114.5
174844	CO APP	C	20071017AH	88.5	181 85619		105-40-31			-40.87	Short
NEW 60.0 dBu Desired = 21.0 km ; Proposed 40.0 dbu; Undesired = 93.5											
Proposed 60.0 dBu Desired = 34.8 km ; NEW 40.0 dbu; Undesired = 64.1											
(Contour overlap requirements are met. See Figure 5.)											
NEW	SANTA MARIA	BNPED	203	A	1.000	Y	39-27-54	N	217.4	73.65	118.1
174844	CO APP	C	20071017AH	88.5	181 85068		105-40-31			-44.47	Short
NEW 60.0 dBu Desired = 24.6 km ; Proposed 40.0 dbu; Undesired = 93.5											
Proposed 60.0 dBu Desired = 34.8 km ; NEW 40.0 dbu; Undesired = 73.1											
(Contour overlap requirements are met. See Figure 5.)											
NEW	SANTA MARIA	BNPED	203	A	1.000	Y	39-27-54	N	217.4	73.65	118.1
174844	CO APP	C	20071017AH	88.5	181 84761		105-40-31			-44.47	Short
NEW 60.0 dBu Desired = 24.6 km ; Proposed 40.0 dbu; Undesired = 93.5											
Proposed 60.0 dBu Desired = 34.8 km ; NEW 40.0 dbu; Undesired = 73.1											
(Contour overlap requirements are met. See Figure 4.)											
KVJZ	VAIL	BMPED	203	A	5.000	N	39-36-56	N	249.7	118.52	164.3
89878	CO CP	C	20080213AC	88.5	464		106-26-57			-45.75	Short
KVJZ 60.0 dBu Desired = 53.2 km ; Proposed 40.0 dbu; Undesired = 93.5											
Proposed 60.0 dBu Desired = 34.8 km ; KVJZ 40.0 dbu; Undesired = 129.											
(Contour overlap requirements are met. See Figure 5.)											
KUWY	LARAMIE	BMPED	203	A	0.134	N	41-18-36	N	350.3	148.49	117.7
91583	WY CP	C	20080128AD	88.5	474		105-27-17			30.80	Clear
KUWY 60.0 dBu Desired = 24.2 km ; Proposed 40.0 dbu; Undesired = 93.5											
Proposed 60.0 dBu Desired = 34.8 km ; KUWY 40.0 dbu; Undesired = 75.6											
KRNC	STEAMBOAT	S LED	203	A	0.240	N	40-27-43	N	290.5	153.37	121.1

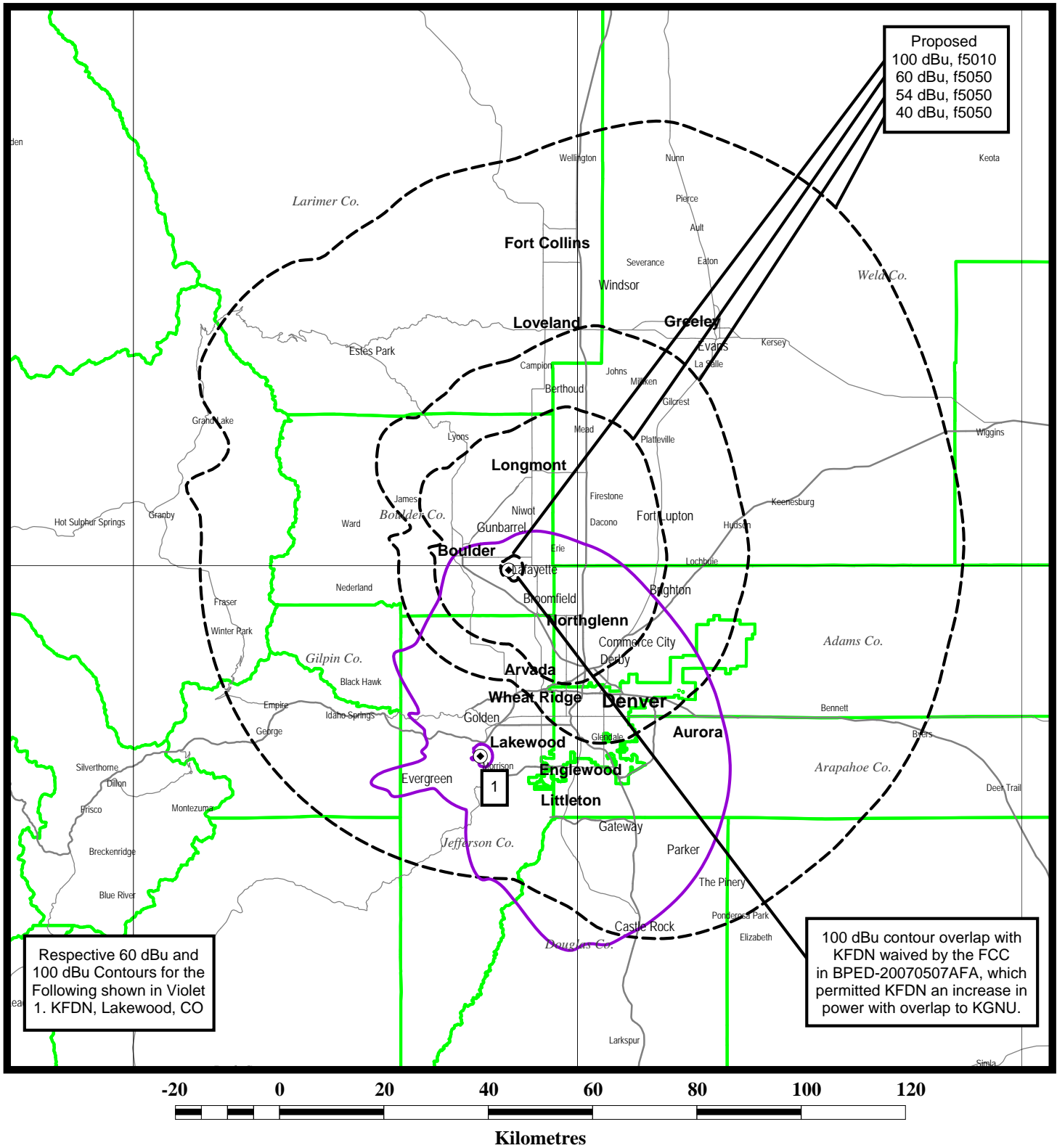
Allocation Study Tabulation (continued)

106485	CO LIC C	20060418AD	88.5	465	106-50-57	32.30	Clear
	KRNC	60.0 dBu Desired = 27.5 km ; Proposed			40.0 dbu; Undesired = 93.5		
		Proposed 60.0 dBu Desired = 34.8 km ; KRNC			40.0 dbu; Undesired = 82.7		
NEW	ESTES PARK	BNPED	204 A	0.290 Y	40-21-38 N	322.9 51.38 82.2	
173750	CO APP C	20071018AX	88.7	508 85580	105-31-12	-30.85	Short
	NEW	60.0 dBu Desired = 30.4 km ; Proposed			54.0 dbu; Undesired = 51.9		
		Proposed 60.0 dBu Desired = 34.8 km ; NEW			54.0 dbu; Undesired = 47.4		
(Contour overlap requirements are met. See Figure 4.)							
KRKM	BRECKENRIDG	BNPED	204 A	0.250 Y	39-29-44 N	233.8 93.07 80.2	
176149	CO CP C	20071022AT	88.7	480 83613	106-01-44	12.89	Close
	KRKM	60.0 dBu Desired = 28.3 km ; Proposed			54.0 dbu; Undesired = 51.9		
		Proposed 60.0 dBu Desired = 34.8 km ; KRKM			54.0 dbu; Undesired = 44.1		
KRKM	BRECKENRIDG	BMPED	204 A	0.300 N	39-29-44 N	233.8 93.07 81.5	
176149	CO APP C	20080327AD	88.7	480	106-01-44	11.59	Close
	KRKM	60.0 dBu Desired = 29.6 km ; Proposed			54.0 dbu; Undesired = 51.9		
		Proposed 60.0 dBu Desired = 34.8 km ; KRKM			54.0 dbu; Undesired = 46.2		
KEZV	RED FEATHER	BNPED	204 A	0.026 Y	40-52-04 N	337.2 105.65 69.7	
176133	CO CP C	20071022AT	88.7	574 83947	105-38-33	35.93	Clear
	KEZV	60.0 dBu Desired = 17.8 km ; Proposed			54.0 dbu; Undesired = 51.9		
		Proposed 60.0 dBu Desired = 34.8 km ; KEZV			54.0 dbu; Undesired = 26.9		
KEZF	SOUTH GREEL	BPED	204 A	0.500 N	41-06-02 N	5.0 123.53 74.9	
84104	WY CP C	20070514AF	88.7	222	105-01-29	48.63	Clear
	KEZF	60.0 dBu Desired = 23.0 km ; Proposed			54.0 dbu; Undesired = 51.9		
		Proposed 60.0 dBu Desired = 34.8 km ; KEZF			54.0 dbu; Undesired = 34.5		
KCME	MANITOU SPR	BLED	204 C1	12.000 N	38-44-40 N	169.6 140.84 158.1	
10791	CO LIC C	19990203KA	88.7	1159	104-51-41	-17.24	Short
	KCME	60.0 dBu Desired = 84.5 km ; Proposed			54.0 dbu; Undesired = 51.9		
		Proposed 60.0 dBu Desired = 34.8 km ; KCME			54.0 dbu; Undesired = 123.		
(Contour overlap requirements are met. See Figure 4.)							
NEW	WAGON MOUND	BNPED	205 C3	1.200 Y	39-59-03 N	92.4 21.44 61.9	
174717	NM APP C	20071022BE	88.9	1074 84173	104-54-13	-40.48	Short
	NEW	60.0 dBu Desired = 58.8 km ; Proposed			100. dbu; Undesired = 3.1		
		Proposed 60.0 dBu Desired = 34.8 km ; NEW			100. dbu; Undesired = 2.4		
NEW	WAGON MOUND	BNPED	205 C3	1.100 N	39-59-03 N	92.4 21.44 61.1	
174717	NM APP C	20071022BE	88.9	1074	104-54-13	-39.64	Short
	NEW	60.0 dBu Desired = 58.0 km ; Proposed			100. dbu; Undesired = 3.1		
		Proposed 60.0 dBu Desired = 34.8 km ; NEW			100. dbu; Undesired = 2.3		
(This application, and its amendment, were filed for Wagon Mound, New Mexico. The incorrect coordinates were specified in the Wagon Mound application and an amendment is pending to correct the coordinates. The correct Wagon Mound transmitter site is located 333 km (207 miles) south of the incorrect coordinates indicated in the Wagon Mound application. Therefore, Wagon Mound application with the correct coordinates will have no allocation effect on the instant proposal. It is presumed that the Wagon Mound application will either be dismissed or corrected, which in either case will resolve any contour overlap issue with the instant proposal.)							

Allocation Study Tabulation (continued)

NEW	CENTRAL CIT	BNPED	205 A	0.090	Y	39-51-58	N	247.2	36.15	35.5
175278	CO APP C	20071018AB	88.9	724	81733	105-32-39			0.69	Close
NEW	60.0 dBu Desired = 27.6 km ; Proposed					100. dbu; Undesired = 3.1				
	Proposed 60.0 dBu Desired = 34.8 km ; NEW					100. dbu; Undesired = .7				
KRFC	FORT COLLIN	BLD	205 A	3.000	N	40-34-53	N	17.8	68.73	36.8
82804	CO LIC C	20030324AD	88.9	66		104-54-20			31.96	Clear
KRFC	60.0 dBu Desired = 19.8 km ; Proposed					100. dbu; Undesired = 3.1				
	Proposed 60.0 dBu Desired = 34.8 km ; KRFC					100. dbu; Undesired = 2.0				
NEW	LIVING SPRI	BNPED	205 A	6.630	Y	39-54-31	N	96.8	76.06	38.0
176441	CO APP C	20071022AR	88.9	132	82633	104-16-16			38.11	Clear
NEW	60.0 dBu Desired = 32.8 km ; Proposed					100. dbu; Undesired = 3.1				
	Proposed 60.0 dBu Desired = 34.8 km ; NEW					100. dbu; Undesired = 3.2				
NEW	FRASER	BNPED	206 A	0.150	Y	39-56-49	N	265.1	56.73	35.6
175363	CO APP C	20071018AB	89.1	63	84139	105-48-57			21.08	Clear
NEW	60.0 dBu Desired = 9.1 km ; Proposed					100. dbu; Undesired = 3.1				
	Proposed 60.0 dBu Desired = 34.8 km ; NEW					100. dbu; Undesired = .8				
NEW	GRANBY	BNPED	206 C3	0.400	Y	40-02-24	N	274.8	66.97	35.8
173747	CO APP C	20071018AX	89.1	45	85653	105-56-11			31.17	Clear
NEW	60.0 dBu Desired = 9.9 km ; Proposed					100. dbu; Undesired = 3.1				
	Proposed 60.0 dBu Desired = 34.8 km ; NEW					100. dbu; Undesired = 1.0				

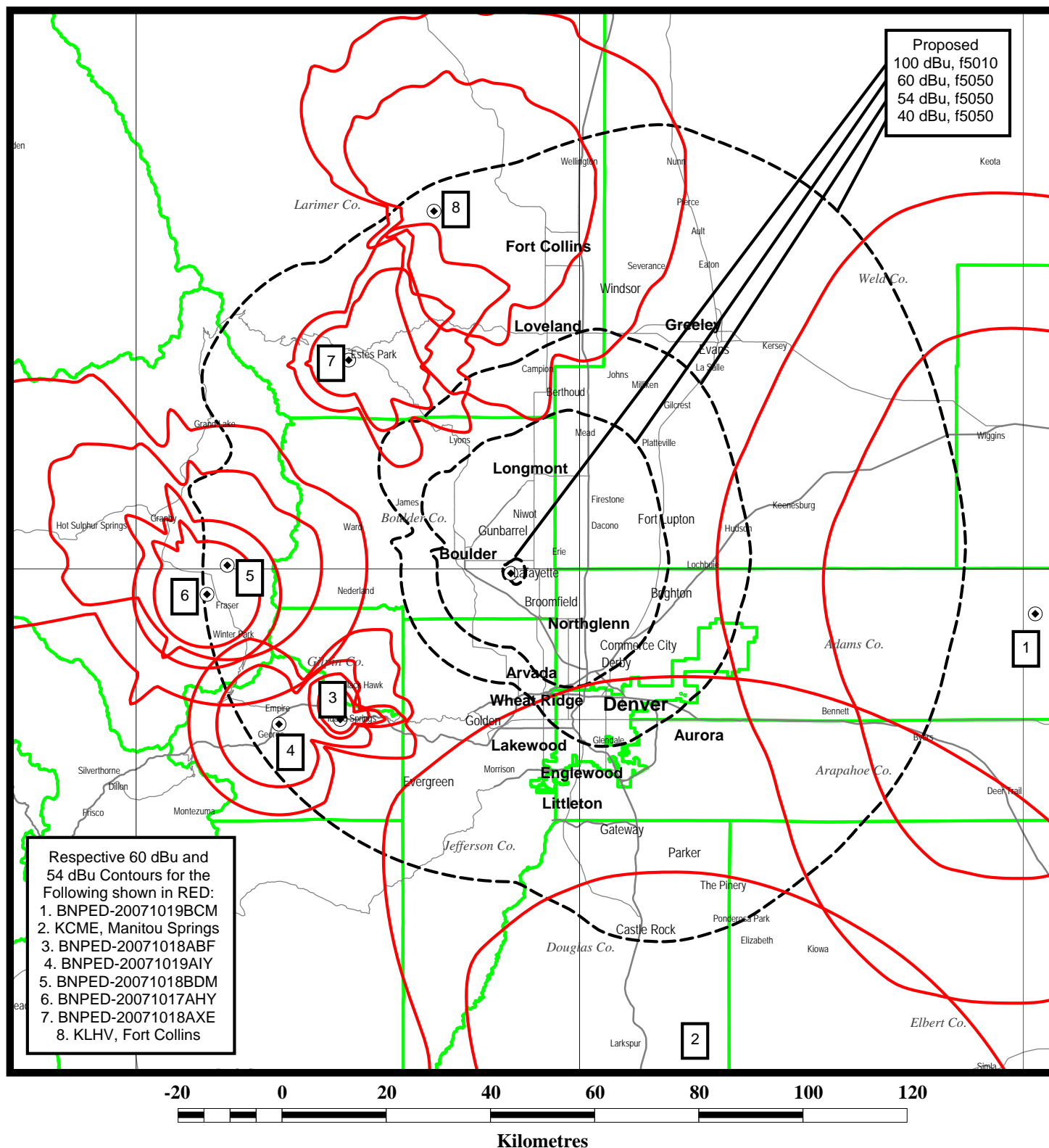
Figure 3



# ALLOCATION STUDY MAP FOR SECOND-/THIRD-ADJACENT CHANNELS

duTreil, Lundin & Rackley, Inc. Sarasota, Florida

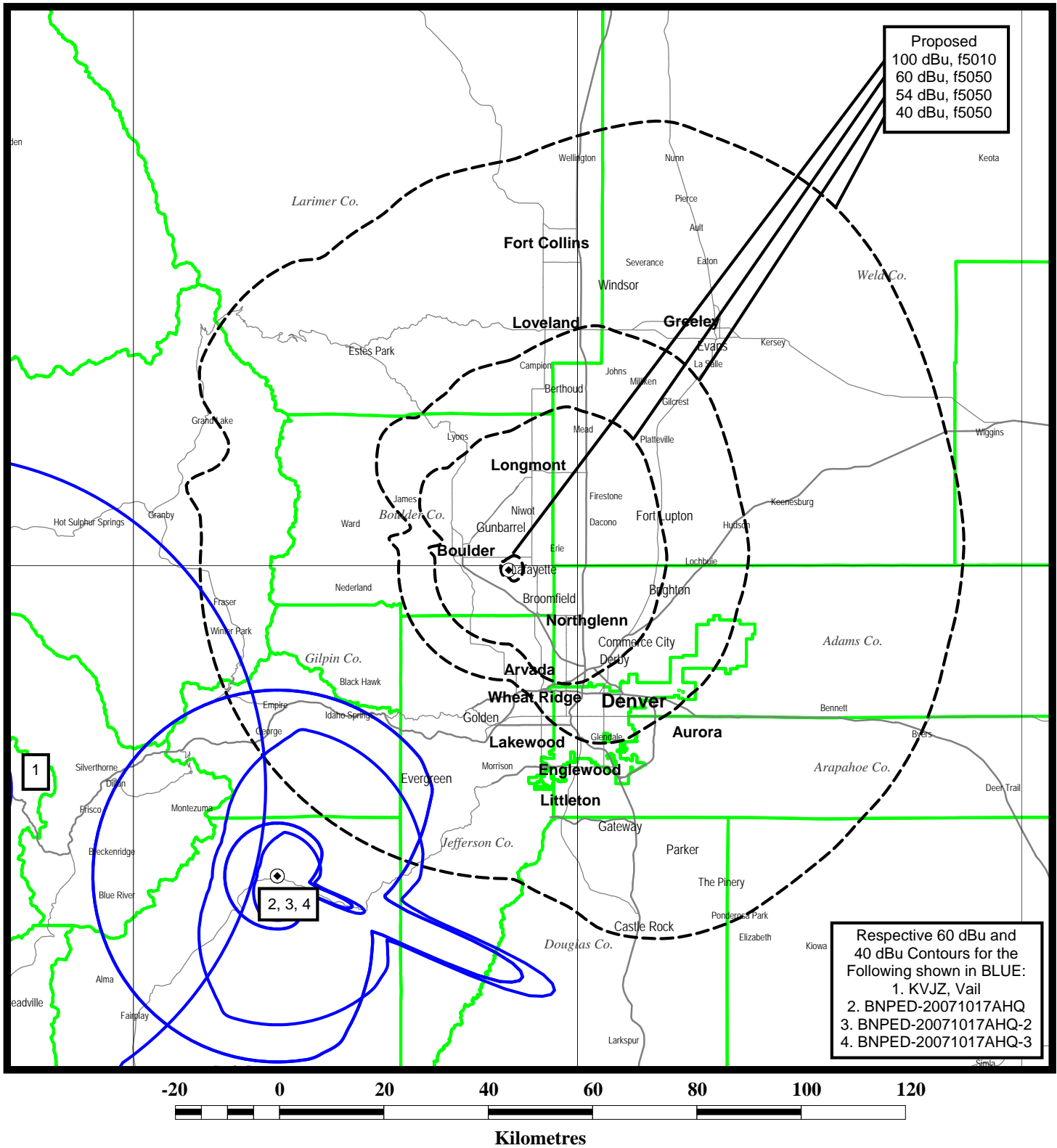
Figure 4



## ALLOCATION STUDY MAP FOR FIRST-ADJACENT CHANNELS

duTreil, Lundin & Rackley, Inc. Sarasota, Florida

Figure 5



# ALLOCATION STUDY MAP FOR CO-CHANNEL

duTreil, Lundin & Rackley, Inc. Sarasota, Florida

Figure 6

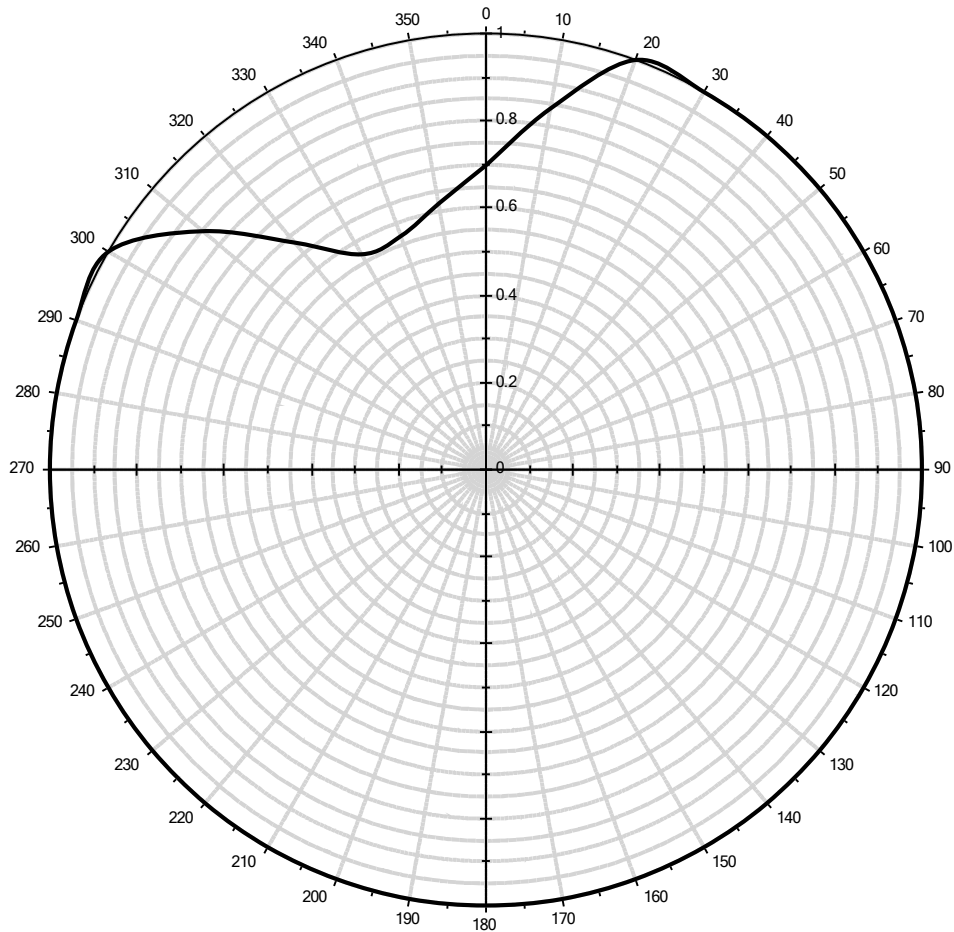
# DA Inquiry

du Treil, Lundin, & Rackley, Inc., Sarasota, Florida



**Antenna Pattern:** Antenna ID: 800100

**DIRECTIONAL ANTENNA  
PATTERN ENVELOPE  
FOR PROPOSED KGNU-FM  
BOULDER, COLORADO  
CHANNEL 203A**



**Note:** display reflects rotation of 0.00°

**Antenna Details:**

0°	0.698	60°	1.000	120°	1.000	180°	1.000	240°	1.000	300°	1.000
10°	0.839	70°	1.000	130°	1.000	190°	1.000	250°	1.000	310°	0.851
20°	1.000	80°	1.000	140°	1.000	200°	1.000	260°	1.000	320°	0.679
30°	1.000	90°	1.000	150°	1.000	210°	1.000	270°	1.000	330°	0.570
40°	1.000	100°	1.000	160°	1.000	220°	1.000	280°	1.000	340°	0.570
50°	1.000	110°	1.000	170°	1.000	230°	1.000	290°	1.000	350°	0.620

**Antenna Make:** ODD

**Standard Pattern:**

**Antenna Model:** ODDKGNUFM

**Last Change Date:**