

# **APPLICATION TO MODIFY A CONSTRUCTION PERMIT**

## **FCC FORM 349**

**File Number BNPFTB-20040914ABG**

**Facility Number - 162588**

**(PRIMARY STATION - KBRU-FM, Facility Number - 38629)**

**KBRU-1**

**Commerce City, Colorado**

**CHANNEL 268 – 101.5 MHz**

**ERP: 20.0 kW (H&V)**

**APPLICANT: On-Air Family, LLC**

**December, 2004**

**Prepared by:**



12585 Old Highway 280 East, Suite 102  
Chelsea, Alabama 35043  
(205) 618-2020

**Engineering Statement  
In Support of an Application to  
Modify a Construction Permit**

**KBRU-1, Commerce City, Colorado, Channel 268**

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**ENGINEERING STATEMENT**

**Of**

**Lee S. Reynolds**

**And**

**Virgle Leon Strickland**

**In Support of a Application**

**to Modify a Construction Permit**

**KBRU-1**

**Commerce City, Colorado**

**Channel 268 – 101.5 MHz**

**ERP: 20 kW(H&V)**

**December, 2004**

**General**

As broadcast technical consultants doing business as Reynolds Technical Associates (RTA), we have been authorized by On-Air Family, LLC (herein referred to as “On-Air Family” as well as “The Applicant”), to conduct engineering studies and prepare the engineering portion of a application to modify a construction permit (file number BNPFTB-20040914ABG). The modified facility is to operate on channel 268 with a non-directional antenna and the effective radiated power of 20 kilowatts.

The KBRU-1 facility is to broadcast the programming of KBRU-FM of Fort Morgan, Colorado, by receiving the signal from the main studio of KBRU-FM by used of STL (microwave). The 60 dBu of the proposed facility is within the 60 dBu contour of the KBRU-FM licensed facility.

KBRU-FM's licensee, On-Air Family, LLC, is the same entity filing the instant FM booster application.

The following engineering studies and exhibits support the instant application study results.

**Surrounding Terrain and Predicted Contours for the Proposed Site**  
**(Exhibit E, Figures 1 through 4)**

Exhibit E, Figure 1 is a terrain averaging and service contour study showing the FCC F(50/50) 60 dBu contour of the licensed main facilities.

Exhibit E, Figure 2 is a terrain averaging and service contour study showing the FCC F(50/50) 60 dBu contour of the proposed FM booster.

The resulting contours for the proposed are shown in map form as Exhibit E, Figure 3 depicting that the 60 dBu contour of the proposed booster is inside of the 60 dBu contour of the main facility.

The distance to the blanketing contour is calculated to be 1.762 kilometer (1.096 mile).

Exhibit E, Figure 4 is a vertical sketch of the existing antenna supporting structure with elevations. The antenna structure registration number for the existing tower is 1201369.

There are no proposed or authorized FM or TV transmitters that may produce receiver-induced interference within ten (10) kilometers of the proposed.

**Human Exposure**  
**(Exhibit E, Figure 5)**

The proposed FM facility was evaluated in terms of potential radiofrequency radiation exposure at ground level. Exhibit E, Figure 5 is the results of that study.

Should anyone be required to climb the tower, the facilities located on the tower have an agreement to either reduce power or cease operation, whichever is necessary, to prevent hazardous exposure to radiofrequency radiation.

**Environmental Impact**  
**(No Exhibits)**

A grant of the proposed construction would not constitute a major action as defined in the Commission's Rules and Regulations.

During operation, the facility will produce no chemical or significant thermal pollution, and no ionizing radiation will be generated. Areas of high intensity radiofrequency fields will be confined to the immediate area of the transmitting antenna, far above the ground and away from any human and wildlife population.

The area is not officially designated as a wilderness area or wildlife preserve and is not pending consideration. The area has no significant value in American history, architecture, archaeology, or culture, which is listed in the Register of Historic Places, and it is not eligible for listing. It is not recognized either nationally or locally for special scenic or recreational value.

## **Conclusion**

This statement/application has been prepared for The Applicant by utilizing the latest available information, cross-checked with the Federal Communications Commission and other sources. Therefore, it is submitted that the proposed is in compliance with the Commission's Rules and Regulations and other sources. We welcome the opportunity to discuss with the staff of the Federal Communications Commission the engineering data contained in this application. Should any questions arise concerning the information, please contact us.

The following pages are exhibits prepared and assembled in support of the proposed.

Lee S. Reynolds  
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### **Statement of the Consultants**

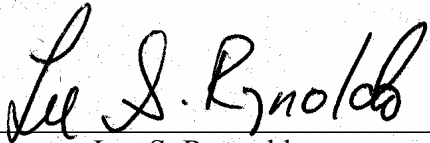
The instant engineering statement was prepared for “The Applicant” and supports an application for a construction permit for a FM booster for the main facility of KBRU-FM, Fort Morgan, Colorado. It was developed by RTA and may not be used for purposes other than submission to the Commission by the applicant.

It may not be reproduced in its entirety, or in part, by anyone (other than from the Commission) without the written consent of RTA.

It is prepared for The Applicant under contractual agreement, and its certification by RTA is used accordingly. If The Applicant fails in its contractual obligation, RTA reserves the right to withdraw its certification.

The information in this application is compiled from the most recent Commission and outside data. RTA is not responsible for errors resulting from incorrect data or unpublished rule and procedure changes.

For RTA:

  
\_\_\_\_\_  
Lee S. Reynolds

December 10<sup>th</sup>, 2004

12585 Old Highway 280 East, Suite 102  
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(205) 618-2020

**Engineering Statement  
In Support of an Application to  
Modify a Construction Permit**

**KBRU-1, Commerce City, Colorado  
Channel 268**

**Terrain-Contour Study for Main Facility**

**Reference Coordinates:**

**North Latitude: 39-55-22**

**West Longitude: 103-58-18**

ERP = 100.0 kW		FM - 2-6 Tables		F(50-50)
Azimuth	Ave. Elev.	Effective	ERP	Distance to
°T.	3 to 16 km	Antenna Height	(dBk)	60 dBu Contour
	Meters AMSL	Meters AAT		km
0	1460.6	644.4	19.638	92.6
5	1467.4	637.6	19.638	92.4
10	1468.8	636.2	19.638	92.3
15	1465.2	639.8	19.638	92.5
20	1459.6	645.4	19.638	92.7
25	1452.0	653.0	19.638	93.0
30	1454.1	650.9	19.638	92.9
35	1454.0	651.0	19.638	92.9
40	1455.1	649.9	19.638	92.8
45	1458.9	646.1	19.638	92.7
50	1460.9	644.1	19.638	92.6
55	1464.5	640.5	19.638	92.5
60	1466.4	638.6	19.638	92.4
65	1468.5	636.5	19.638	92.3
70	1471.4	633.6	19.638	92.2
75	1475.3	629.7	19.638	92.1
80	1477.2	627.8	19.638	92.0
85	1482.4	622.6	19.638	91.8
90	1490.6	614.4	19.638	91.5
95	1495.3	609.7	19.638	91.3
100	1496.6	608.4	19.638	91.3
105	1497.9	607.1	19.638	91.2
110	1500.3	604.7	19.638	91.1
115	1504.1	600.9	19.638	91.0
120	1504.9	600.1	19.638	91.0
125	1509.3	595.7	19.638	90.8
130	1515.4	589.6	19.638	90.6
135	1514.4	590.6	19.638	90.6
140	1525.4	579.6	19.638	90.2
145	1531.5	573.5	19.638	89.9
150	1537.6	567.4	19.638	89.6
155	1538.8	566.2	19.638	89.6

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ERP =	100.0 kW	FM - 2-6 Tables		F(50-50)
Azimuth	Ave. Elev.	Effective	ERP	Distance to
°T.	3 to 16 km	Antenna Height	(dBk)	70 dBu Contour
	Meters AMSL	Meters AAT		km
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160	1543.3	561.7	19.638	89.4
165	1538.3	566.7	19.638	89.6
170	1531.6	573.4	19.638	89.9
175	1528.6	576.4	19.638	90.0
180	1519.1	585.9	19.638	90.4
185	1515.3	589.7	19.638	90.6
190	1509.8	595.2	19.638	90.8
195	1508.2	596.8	19.638	90.8
200	1503.7	601.3	19.638	91.0
205	1505.7	599.3	19.638	90.9
210	1504.5	600.5	19.638	91.0
215	1501.8	603.2	19.638	91.1
220	1499.0	606.0	19.638	91.2
225	1497.0	608.0	19.638	91.3
230	1495.7	609.3	19.638	91.3
235	1493.0	612.0	19.638	91.4
240	1488.8	616.2	19.638	91.6
245	1484.2	620.8	19.638	91.7
250	1481.4	623.6	19.638	91.9
255	1480.1	624.9	19.638	91.9
260	1478.1	626.9	19.638	92.0
265	1476.2	628.8	19.638	92.0
270	1473.8	631.2	19.638	92.1
275	1472.7	632.3	19.638	92.2
280	1470.7	634.3	19.638	92.3
285	1468.9	636.1	19.638	92.3
290	1466.6	638.4	19.638	92.4
295	1464.2	640.8	19.638	92.5
300	1463.4	641.6	19.638	92.5
305	1462.4	642.6	19.638	92.6
310	1461.6	643.4	19.638	92.6
315	1459.0	646.0	19.638	92.7
320	1456.7	648.3	19.638	92.8
325	1454.7	650.3	19.638	92.9
330	1451.0	654.0	19.638	93.0
335	1448.4	656.6	19.638	93.1
340	1447.0	658.0	19.638	93.2
345	1448.7	656.3	19.638	93.1
350	1447.9	657.1	19.638	93.1
355	1454.0	651.0	19.638	92.9
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**Engineering Statement  
In Support of an Application to  
Modify a Construction Permit**

**KBRU-1, Commerce City, Colorado  
Channel 268**

**Terrain-Contour Study for Booster Facility**

**Reference Coordinates:**

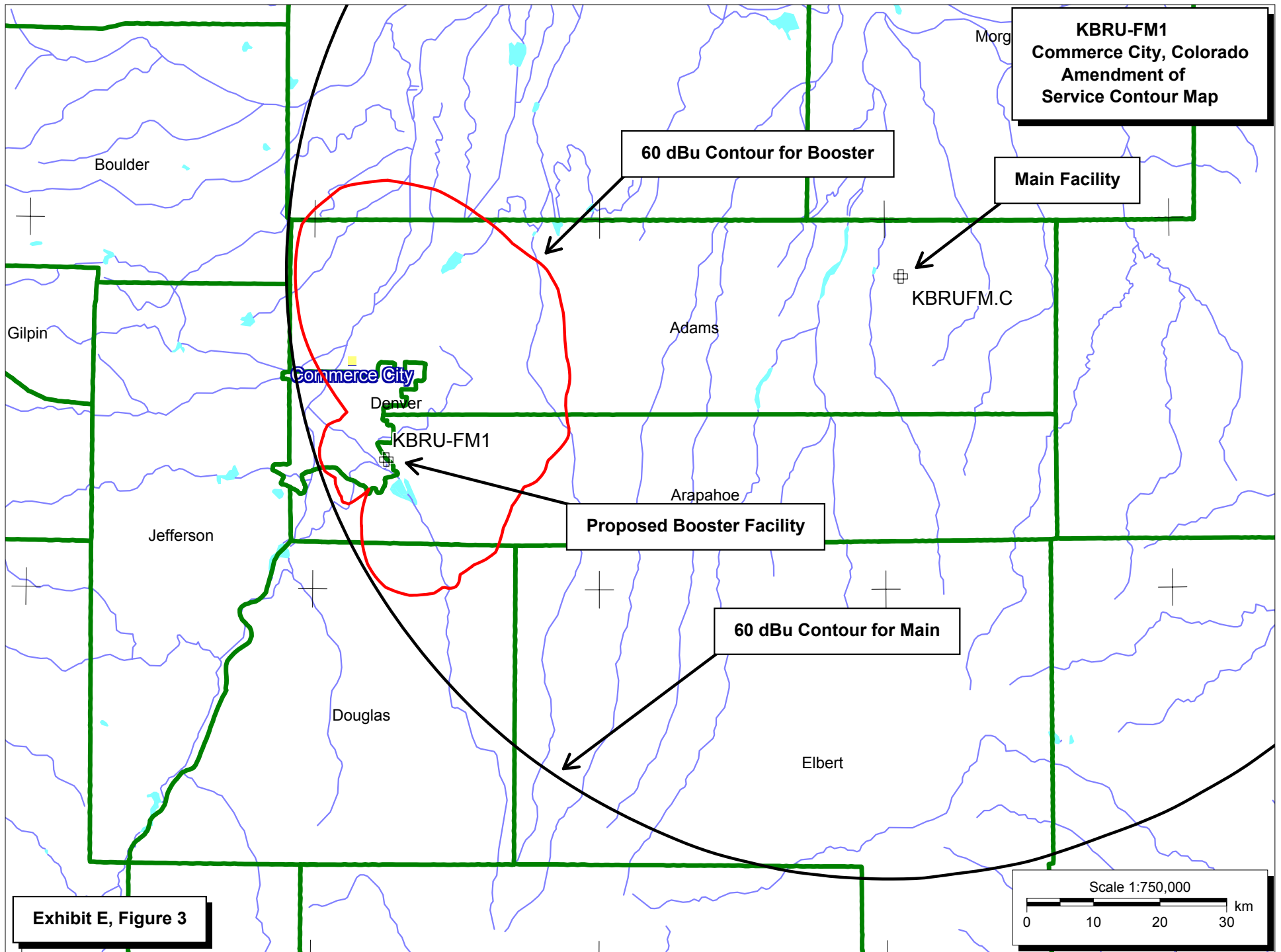
**North Latitude: 39-40-31**

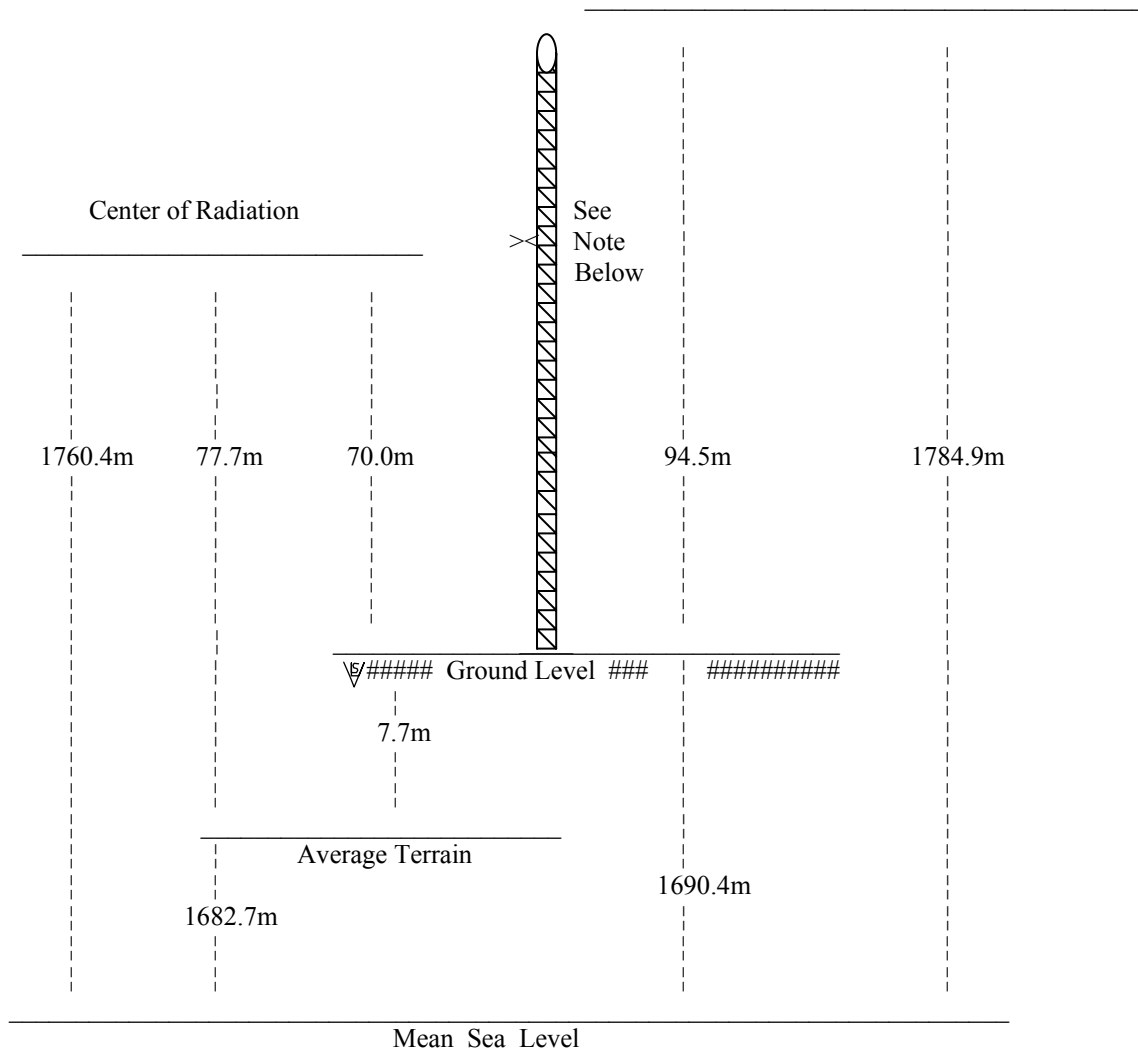
**West Longitude: 104-52-22**

ERP = 20.0 kW		FM - 2-6 Tables		F(50-50)
Azimuth	Ave. Elev.	Effective	ERP	Distance to
°T.	3 to 16 km	Antenna Height	(dBk)	60 dBu Contour
	Meters AMSL	Meters AAT		km
0	1622.4	138.0	12.701	41.9
5	1625.5	134.9	12.678	41.5
10	1627.5	132.9	12.656	41.2
15	1631.6	128.8	12.450	40.3
20	1636.4	124.0	12.239	39.3
25	1641.7	118.7	12.167	38.5
30	1647.9	112.5	12.095	37.5
35	1654.0	106.4	12.473	37.3
40	1658.6	101.8	12.835	37.3
45	1666.1	94.3	12.967	36.3
50	1672.6	87.8	12.656	34.5
55	1677.8	82.6	12.143	32.6
60	1680.3	80.1	11.599	31.1
65	1683.7	76.7	11.496	30.3
70	1691.7	68.7	11.392	28.7
75	1700.2	60.2	11.949	27.9
80	1704.4	56.0	12.473	27.8
85	1710.7	49.7	12.701	26.6
90	1720.4	40.0	12.923	24.3
95	1722.4	38.0	12.813	23.6
100	1728.4	32.0	12.701	21.7
105	1737.1	23.3	12.262	20.6
110	1746.8	13.6	11.801	20.1
115	1756.1	4.3	11.900	20.2
120	1758.8	1.6	11.998	20.3
125	1759.9	0.5	12.519	20.9
130	1757.9	2.5	13.010	21.5
135	1754.7	5.7	12.701	21.2
140	1749.9	10.5	12.191	20.6
145	1736.0	24.4	12.167	20.5
150	1726.6	33.8	12.143	21.6
155	1729.7	30.7	12.496	21.1

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ERP =	20.0 kW	FM - 2-6 Tables		F(50-50)
Azimuth	Ave. Elev.	Effective	ERP	Distance to
°T.	3 to 16 km	Antenna Height	(dBk)	70 dBu Contour
	Meters AMSL	Meters AAT		km
<hr/>				
160	1736.0	24.4	12.835	21.3
165	1740.5	19.9	12.565	21.0
170	1748.1	12.3	12.286	20.7
175	1753.5	6.9	11.650	19.9
180	1755.0	5.4	10.963	19.2
185	1752.0	8.4	9.564	17.6
190	1745.0	15.4	7.896	15.9
195	1737.9	22.5	4.997	13.4
200	1729.2	31.2	0.615	10.7
205	1726.9	33.5	-4.067	8.4
210	1716.5	43.9	-14.949	5.1
215	1704.5	55.9	-11.796	6.9
220	1693.0	67.4	-9.488	8.7
225	1681.9	78.5	-10.088	9.1
230	1675.7	84.7	-11.427	8.7
235	1670.0	90.4	-12.182	8.7
240	1663.8	96.6	-13.010	8.5
245	1656.3	104.1	-13.925	8.4
250	1650.7	109.7	-14.949	8.1
255	1646.5	113.9	-13.925	8.8
260	1642.0	118.4	-13.010	9.4
265	1642.6	117.8	-12.587	9.6
270	1641.4	119.0	-12.182	9.9
275	1637.6	122.8	-12.182	10.1
280	1635.6	124.8	-12.182	10.1
285	1631.1	129.3	-12.587	10.1
290	1625.1	135.3	-13.010	10.1
295	1621.9	138.5	-13.010	10.2
300	1621.7	138.7	-13.010	10.2
305	1620.8	139.6	-13.925	9.7
310	1621.0	139.4	-14.949	9.2
315	1619.8	140.6	-14.949	9.2
320	1619.0	141.4	-14.949	9.2
325	1618.5	141.9	-1.189	20.6
330	1619.3	141.1	3.892	26.9
335	1619.2	141.2	7.496	32.6
340	1617.4	143.0	10.035	37.5
345	1617.9	142.5	11.126	39.5
350	1618.3	142.1	12.095	41.3
355	1619.9	140.5	12.403	41.7
<hr/>				





Proposed Location - 39° 40' 31" N. Lat. 104° 52' 22" W. Long. [NAD 27]

NOT DRAWN TO SCALE

Proposed antenna - Shively Labs, 6016-1/3

Antenna Structure Registration Number: 1201368

Note: The antenna is being proposed to be used as a common antenna (shared with proposed KSIR-FM2 with the same ERP).

**Engineering Statement  
In Support of an Application to  
Modify a Construction Permit**

**KBRU-1, Commerce City, Colorado**

**Human Exposure To Radiofrequency Radiation Study**

<u>CALL</u>	<u>Service</u>	<u>Channel</u>	<u>Freq.</u>	<u>Polarization</u>	<u>Antenna Height* (AGL)</u>	<u>ERP (kW)</u>	<u>Relative Field Factor</u>	<u>Vertical Predicted Power Density (mW/cm<sup>2</sup>)</u>	<u>FCC Uncontrolled Limit (mW/cm<sup>2</sup>)</u>	<u>Percent of Uncontrolled Limit</u>
KBRU-1	FM	268	101.5	H&V	70	20.000	1.000	0.0368345	0.200	18.4173%
KSIR-FM2	FM	296	107.1	H&V	70	20.000	1.000	0.0368345	0.200	18.4173%

Total Percentage of ANSI (uncontrolled) value = 36.385%

\* The antenna height indicated above is 2 meters less than the actual antenna height so that the predicted power density consider the 2 meter human height allowance.

The tabulation of elevation pattern for the antenna for each facility was used to determine the power density for each. Furthermore, the highest field between the depression angles of 70 and 90 degrees were used. At a depression angle of 70 degrees or less, the inclination of the angle would place the area of concern 2 meters above ground level. The power density for the FM facility was determined by use the following formula:

$$(33.41 * \text{Total ERP in kW considering the elevation pattern tabulations}) / (\text{COR in meters} - 2 \text{ meter})^2$$

The KBRU-1 facility proposes to use a Shively Labs 6016-1/3 antenna (single level, 3 panel) mounted 70 meters above ground level with 20 kw. ERP. It was determined that 70 degrees was the highest between 70 and 90 degrees by using tabulations of vertical field provided by Shively Labs. ) is 0.357. The power density at 70 degrees was computed to be 36.835  $\mu\text{W}/\text{cm}^2$ .

The KSIR-FM2 facility proposes to use a Shively Labs 6016-1/3 antenna (single level, 3 panel) mounted 70 meters above ground level with 20 kw. ERP. It was determined that 70 degrees was the highest between 70 and 90 degrees by using tabulations of vertical field provided by Shively Labs. ) is 0.357. The power density at 70 degrees was computed to be 36.835  $\mu\text{W}/\text{cm}^2$ .

As demonstrated, the total percentage of the ANSI values, considering the radiation of the proposed combined facilities on the supporting structure of the study site is 36.835% of the limit for the “uncontrolled” environments and 7.37% of the limit for the “controlled” environments.

Attached is documentation of the vertical relative field for KBRU-1 and KSIR-FM2 provided by Shively Labs.

Antenna Mfg.: Shively Labs  
Antenna Type: 6016-1/3 Vertical

Date: 12/3/2004

Station: KBRU

Beam Tilt 0

Frequency: 101.5

Gain (Max) 0.907 -0.423 dB

Channel #: 268

Gain (Horizon) 0.907 -0.423 dB

Figure: 3

Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field
-90	0.000	-44	0.729	0	1.000	46	0.705
-89	0.021	-43	0.741	1	1.000	47	0.693
-88	0.040	-42	0.752	2	0.999	48	0.680
-87	0.059	-41	0.763	3	0.999	49	0.667
-86	0.078	-40	0.774	4	0.998	50	0.654
-85	0.096	-39	0.785	5	0.996	51	0.641
-84	0.114	-38	0.796	6	0.995	52	0.628
-83	0.133	-37	0.806	7	0.993	53	0.614
-82	0.151	-36	0.816	8	0.991	54	0.600
-81	0.168	-35	0.826	9	0.988	55	0.586
-80	0.186	-34	0.835	10	0.985	56	0.572
-79	0.204	-33	0.845	11	0.982	57	0.558
-78	0.221	-32	0.854	12	0.979	58	0.544
-77	0.239	-31	0.862	13	0.975	59	0.529
-76	0.256	-30	0.871	14	0.971	60	0.514
-75	0.273	-29	0.879	15	0.967	61	0.499
-74	0.290	-28	0.887	16	0.963	62	0.484
-73	0.307	-27	0.895	17	0.958	63	0.469
-72	0.324	-26	0.903	18	0.953	64	0.453
-71	0.341	-25	0.910	19	0.948	65	0.437
-70	0.357	-24	0.917	20	0.942	66	0.422
-69	0.373	-23	0.924	21	0.936	67	0.406
-68	0.390	-22	0.930	22	0.930	68	0.390
-67	0.406	-21	0.936	23	0.924	69	0.373
-66	0.422	-20	0.942	24	0.917	70	0.357
-65	0.437	-19	0.948	25	0.910	71	0.341
-64	0.453	-18	0.953	26	0.903	72	0.324
-63	0.469	-17	0.958	27	0.895	73	0.307
-62	0.484	-16	0.963	28	0.887	74	0.290
-61	0.499	-15	0.967	29	0.879	75	0.273
-60	0.514	-14	0.971	30	0.871	76	0.256
-59	0.529	-13	0.975	31	0.862	77	0.239
-58	0.544	-12	0.979	32	0.854	78	0.221
-57	0.558	-11	0.982	33	0.845	79	0.204
-56	0.572	-10	0.985	34	0.835	80	0.186
-55	0.586	-9	0.988	35	0.826	81	0.168
-54	0.600	-8	0.991	36	0.816	82	0.151
-53	0.614	-7	0.993	37	0.806	83	0.133
-52	0.628	-6	0.995	38	0.796	84	0.114
-51	0.641	-5	0.996	39	0.785	85	0.096
-50	0.654	-4	0.998	40	0.774	86	0.078
-49	0.667	-3	0.999	41	0.763	87	0.059
-48	0.680	-2	0.999	42	0.752	88	0.040
-47	0.693	-1	1.000	43	0.741	89	0.021
-46	0.705	0	1.000	44	0.729	90	0.000
-45	0.717			45	0.717		

Antenna Mfg.: Shively Labs  
Antenna Type: 6016-1/3 Vertical

Date: 12/3/2004

Station: KSIR

Beam Tilt 0

Frequency: 107.1

Gain (Max) 0.904 -0.437 dB

Channel #: 296

Gain (Horizon) 0.904 -0.437 dB

Figure: 3

Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field
-90	0.000	-44	0.729	0	1.000	46	0.705
-89	0.021	-43	0.741	1	1.000	47	0.693
-88	0.040	-42	0.752	2	0.999	48	0.680
-87	0.059	-41	0.763	3	0.999	49	0.667
-86	0.078	-40	0.774	4	0.998	50	0.654
-85	0.096	-39	0.785	5	0.996	51	0.641
-84	0.114	-38	0.796	6	0.995	52	0.628
-83	0.133	-37	0.806	7	0.993	53	0.614
-82	0.151	-36	0.816	8	0.991	54	0.600
-81	0.168	-35	0.826	9	0.988	55	0.586
-80	0.186	-34	0.835	10	0.985	56	0.572
-79	0.204	-33	0.845	11	0.982	57	0.558
-78	0.221	-32	0.854	12	0.979	58	0.544
-77	0.239	-31	0.862	13	0.975	59	0.529
-76	0.256	-30	0.871	14	0.971	60	0.514
-75	0.273	-29	0.879	15	0.967	61	0.499
-74	0.290	-28	0.887	16	0.963	62	0.484
-73	0.307	-27	0.895	17	0.958	63	0.469
-72	0.324	-26	0.903	18	0.953	64	0.453
-71	0.341	-25	0.910	19	0.948	65	0.437
-70	0.357	-24	0.917	20	0.942	66	0.422
-69	0.373	-23	0.924	21	0.936	67	0.406
-68	0.390	-22	0.930	22	0.930	68	0.390
-67	0.406	-21	0.936	23	0.924	69	0.373
-66	0.422	-20	0.942	24	0.917	70	0.357
-65	0.437	-19	0.948	25	0.910	71	0.341
-64	0.453	-18	0.953	26	0.903	72	0.324
-63	0.469	-17	0.958	27	0.895	73	0.307
-62	0.484	-16	0.963	28	0.887	74	0.290
-61	0.499	-15	0.967	29	0.879	75	0.273
-60	0.514	-14	0.971	30	0.871	76	0.256
-59	0.529	-13	0.975	31	0.862	77	0.239
-58	0.544	-12	0.979	32	0.854	78	0.221
-57	0.558	-11	0.982	33	0.845	79	0.204
-56	0.572	-10	0.985	34	0.835	80	0.186
-55	0.586	-9	0.988	35	0.826	81	0.168
-54	0.600	-8	0.991	36	0.816	82	0.151
-53	0.614	-7	0.993	37	0.806	83	0.133
-52	0.628	-6	0.995	38	0.796	84	0.114
-51	0.641	-5	0.996	39	0.785	85	0.096
-50	0.654	-4	0.998	40	0.774	86	0.078
-49	0.667	-3	0.999	41	0.763	87	0.059
-48	0.680	-2	0.999	42	0.752	88	0.040
-47	0.693	-1	1.000	43	0.741	89	0.021
-46	0.705	0	1.000	44	0.729	90	0.000
-45	0.717			45	0.717		