

**EXHIBIT #E1**  
**ENGINEERING STATEMENT**

Concerning the Application of  
**Optima Communications, Inc**  
To Change Station KSKX to a Class C1, Increase Power and Change Antenna

August 2001

**Channel 288 C1**

**11.0 kW H & V**

This engineering statement supports the application filed by Optima Communications to carry out an increase of power and class under one-step processing.

Under the instant proposal, a type approved, FM transmitter generates an output power of 12.63 kilowatts. The proposed Andrew MACX350, 50-ohm air Heliax 3 1/8" transmission line, has an efficiency for its 60 meter (181') length of 95.3 percent. Therefore, the proposed 6-bay, 3/4 wavelength, ERI SHP-6 circularly polarized, antenna has at its input 12.82 kilowatts of power. The antenna has a maximum power gain of 2.562 resulting in a maximum effective radiated power of 11 kW.

No change to the tower height is requested. The site map for this station is on file with the Commission under BLH 19910829KF.

Page #4 of this exhibit is a tabulation of the height above average terrain of each of the individual cardinal radials. A total of eight evenly-spaced radials were used to determine the antenna height above average terrain. The 30 second NGDC digital terrain elevation database was used to extract the elevation points along the pertinent radials. The elevation points were derived using the required four-point interpolation method and then the average was employed to project antenna heights above average terrain and the consequent distances to signal contours along the pertinent radials. The Commission's own TVFMINT computer algorithm was used for this purpose

**One-Step Processing:**

The applicant requests one-step processing pursuant to the report and Order in MM Docket 92-159, 8 FCC 2d 4735. The *Exhibit #E2* channel-study shows that there is a fully-allocatable site available for C1 class operation. Page #2 of this exhibit shows that the principal city will be served by a 3.16 mV/m (70 dBu) signal or better from the allocation site. *It should be noted that a co-channel allocation proposal exists for Genoa,*

*Colorado that conflicts with this proposal.* The map shows the eight cardinal radials and a radial through the city of license. The political boundaries of Security, Colorado, the community of licensee, are shown to be fully encompassed by the proposed 70 dBu city service contour.

### **Allocation Study:**

*Exhibit #E3*, is a map of the proposed 70 dBu principal-city signal contour. The principal city of Security, Colorado is shown to be entirely within the principal-city signal contour. The 60 dBu signal contour is also shown.

The scaled coverage map in this exhibit and the map shown in *Exhibit #E2* was computer generated using the USGS, Digital Map of the World polygon data. A total of 360 evenly spaced radials were used to plot the signal contours. The area within the proposed 60 dBu contour amounts to 14,887.1 square kilometers. This figure was determined by squaring the distance to the 60 dBu contour along 360 radials. The average was then determined and used in the following formula to determine the area within the contour:  $\text{Area} = \pi(\text{radial distance squared average})$ . The population within the 60 dBu service contour was determined to be 746,644 people through the use of a computer program which extracts a population count based on population centroids defined by U.S. Census year 2000 (PL-94-171) digital census data. This program draws data down to the block level.

*Exhibit #E4* is a computer-generated channel-study showing that the proposed class C1 station, at the proposed transmitter site, meets all minimum spacing requirements of Section 73.207 of the Commission's Rules and Regulations except in regard to KXKL-FM, Denver, Colorado. With regard to this station the applicant requests processing under Section 73.215. Page #2 is a contour-to-contour channel study showing that KXKL-FM is protected on the direct line between the proposed facility and its transmitter. For the purpose of this study KXKL-FM's Class C facilities have been change to reflect the standard maximum antenna height and power for its class. Page #3 of this exhibit is a map that plots the interfering and protected signal contours of each station. Page #4 and #5 consist of a tabular study in the FCC's FMOVER format. Page #6 is a narrative on the conventions used for the contour-to-contour channel-study shown in page #2. This documentation confirms that no overlap interference will be caused by the proposed facilities nor will overlap interference be received. All I.F. spacing relationships are fully met. The proposed facility is not within 320 kilometers of the U.S. border with Canada or Mexico.

### **Antenna:**

The applicant proposes to install a new antenna having 2.5 degrees beam tilt with 10 percent null fill within the first null. A vertical elevation field graph of this proposed

antenna can be found attached as page #5.

Over height calculation: The proposed HAAT of 682.2 meters is 383.2 meters above the maximum antenna height for class C1 operation. Equivalence was determined by using the maximum class C1, 60 dBu distance of 72 kilometers. The proposed 11 kilowatts ERP at an HAAT of 682.2 meters generates a 60 dBu signal contour distance of 71.8 kilometers.

The proposed ERI SHP-6 antenna will employ  $\frac{3}{4}$  wave bay spacing to reduce downward radiation.

#### **Blanketing and Intermodulation:**

The applicant understands its obligation to correct any blanketing interference it may cause within its 115 dBu blanketing contour within the first year of operation. Intermodulation between the stations at the site may occur, but since KSKX is already on the air, using the proposed channel without significant reported intermodulation products little or no new interference is expected.

#### **R.F. Hazard Compliance:**

The applicant's proposed transmitter site is located on the Cheyenne Mountain telecommunications site. This is an antenna farm location that is closed to public access and posted with appropriate R.F. warning signs. The applicant proposes to use an ERP SHP-6 bay (EPA type #3)  $\frac{3}{4}$  wavelength antenna.

Based on the formulas expressed in the OET Bulletin, No. 65, August 1997, "Evaluating Compliance with F.C.C. Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", published by the Federal Communication Commission's Office of Science and Engineering, the proposed facility is predicted to produce a worst-case maximum R.F. non-ionization radiation level at a position six feet above the tower base (head level - based on the C.O.R. of 58 meters of 0.391 microwatts per square centimeter. This value is only .0391 percent of the maximum standard value for the frequency in use for this controlled area. Page #6 of this exhibit is a graph of the non-ionization radiation level from the tower base to a distance of 100 meters. Since the predicted value is less than one percent additional study was deemed unnecessary.

Page #7 of this exhibit is a certification of the qualifications of the broadcast engineering consultant who prepared these exhibits.

Ex #E1, Pg #4

Optimus Communications Inc.

ERP = 11 kW

Channel = 288

Azimuth Deg.T.	Ave. Elev. 3 to 16 km Meters AMSL	Effective Antenna Height Meters AAT	ERP (dBk)	F(50-50) Distance to 70 dBu Contour km	F(50-50) Distance to 60 dBu Contour km
0	1930.9	1001.1	10.414	56.62	80.56
45	1847.3	1084.7	10.414	58.15	82.19
90	1778.2	1153.8	10.414	59.31	83.43
135	1791.6	1140.4	10.414	59.09	83.20
180	2040.0	892.0	10.414	54.42	78.25
225	2808.8	123.2	10.414	21.13	35.82
270	3038.2	-106.2	10.414	10.40	18.57
315	2763.6	168.4	10.414	24.33	41.14
Ave. = 2249.8 M		682.2 M			

Additional Radials: (Not Considered in Average):

82	2763.6	2932.0	10.414	65.28	89.53
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Antenna Radiation Center AMSL = 2932 M

NGDC 30 Arc Sec.

Geographic Coordinates:

N. Lat. 38 44 40

W. Lng. 104 51 41

ELECTRONICS RESEARCH, INC.  
7777 GARDNER ROAD  
CHANDLER, IN. 47610

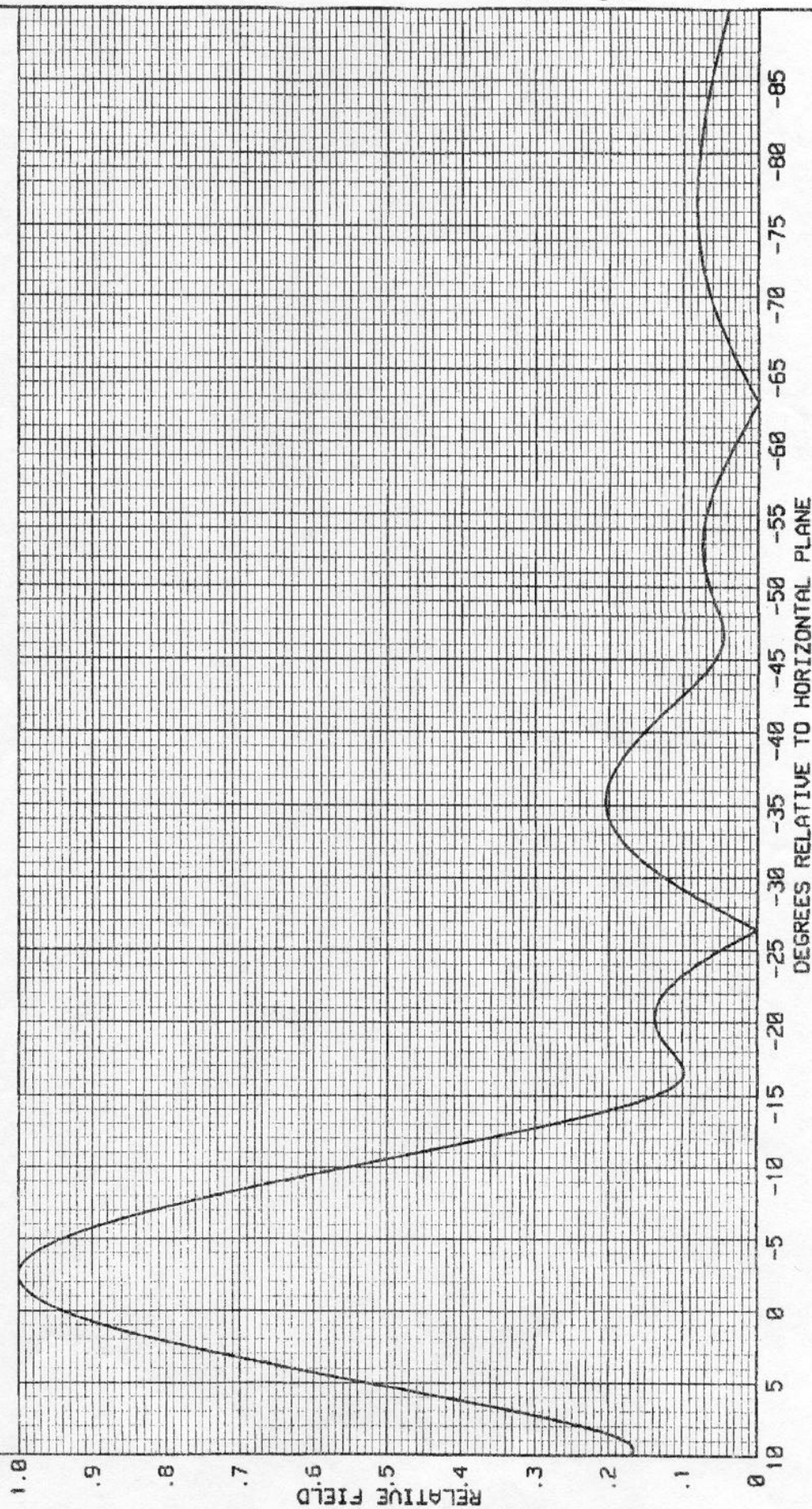
FIGURE 1

-----THEORETICAL-----  
VERTICAL PLANE RELATIVE FIELD

AUGUST 2, 2001  
ELEMENT SPACING:  
0.75 WAVELENGTH

6 ERI TYPE SHP, SHPX, LP, OR LPX ELEMENTS  
-2.5 DEGREE(S) ELECTRICAL BEAM TILT  
10 PERCENT FIRST NULL FILL  
0 PERCENT SECOND NULL FILL

POWER GAIN IS 2.266 IN THE HORIZONTAL PLANE(2.562 IN THE MAX.)





Mode	Study	Method
<input checked="" type="radio"/> Reg	<input checked="" type="radio"/> FM	<input type="radio"/> OET #69
<input type="radio"/> Spd	<input type="radio"/> TV	<input checked="" type="radio"/> OET Mod

Scale =  $\mu W/\text{sq cm}$

☒ 50 ☐ 100 ☐ 200 ☐ 500 ☐ 1000 ☐ 2000 ☐ 3000

Antenna Parameters

H kW

V kW

# of Bays  Spacing

COR Meters Above Ground

Dist. in Meters to Tower Base

—EP4 Antenna Types—

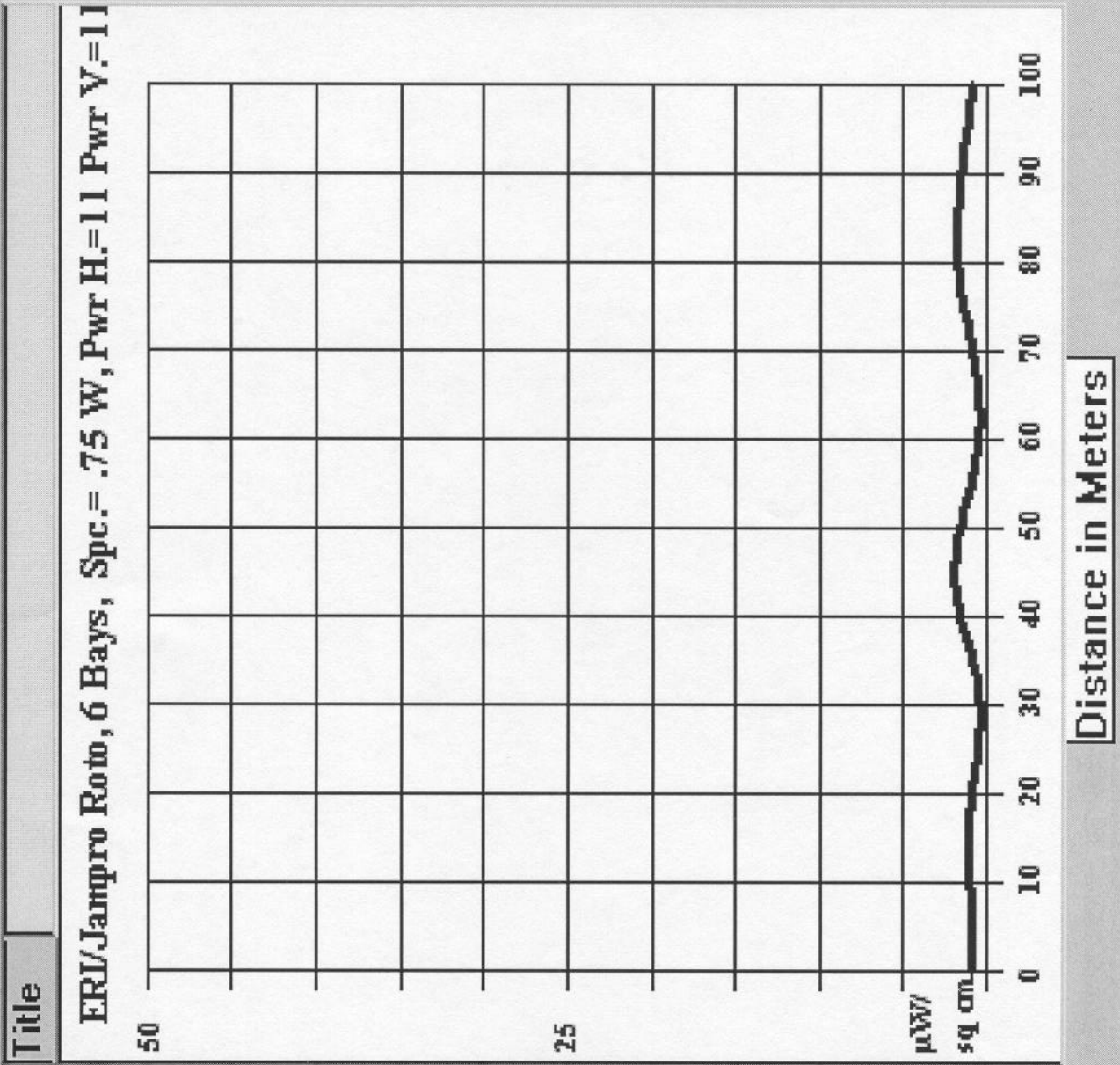
- ☐ 1.) Dipole/Ring Stub
- ☐ 2.) Jampro Double V
- ☒ 3.) ERI/Jampro Roto
- ☐ 4.) RCA ( old BFG)
- ☐ 5.) Dielectric (BFC)
- ☐ 6.) Shively 6800

Max = 1000  $\mu\text{W}/\text{sq cm}$

Pwr Density % of Max    Controlled

       ☒ Yes    ☐ No

$\mu\text{W}/\text{sq cm}$



**Declaration:**

I, Douglas L. Vernier, declare that I have received training as an engineer from the University of Michigan School of Engineering. That, I have received degrees from the University in the field of Broadcast Telecommunications. That, I have been active in broadcast consulting for over 25 years;

That, I have held a Federal Communications Commission First Class Radiotelephone License continually since 1964. In 1985, this license was reissued by the Commission as a lifetime General Radiotelephone license no. PG-16-16464;

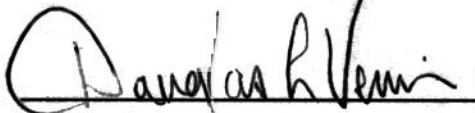
That, I am certified as a Professional Broadcast Engineer (#50258) by the Society of Broadcast Engineers, Indianapolis, Indiana. (Re-certified 10/2000.)

That, my qualifications are a matter of record with the Federal Communications Commission;

That, I have been retained by Optima Communications, Inc. and as such have prepared the engineering showings appended hereto;

That, I have prepared these broadcast engineering showings, the technical information contained in same and the facts stated within are true of my knowledge;

That, under penalty of perjury, I declare that the foregoing is correct.



Douglas L. Vernier

Executed on August 3, 2001

Subscribed and sworn before me this 3rd day of August 2001



Katherine G. Miller  
Notary Public in and for the State of Iowa

Ex #E2, One-Step Processing  
 Doug Vernier Telecommunications Consultants  
 1600 Picturesque Dr. Cedar Falls IA 50613  
 Security Colorado  
 C1 Allocation Site

REFERENCE  
 38 41 45 N  
 104 50 52 W

CLASS = C1  
 Current Spacings

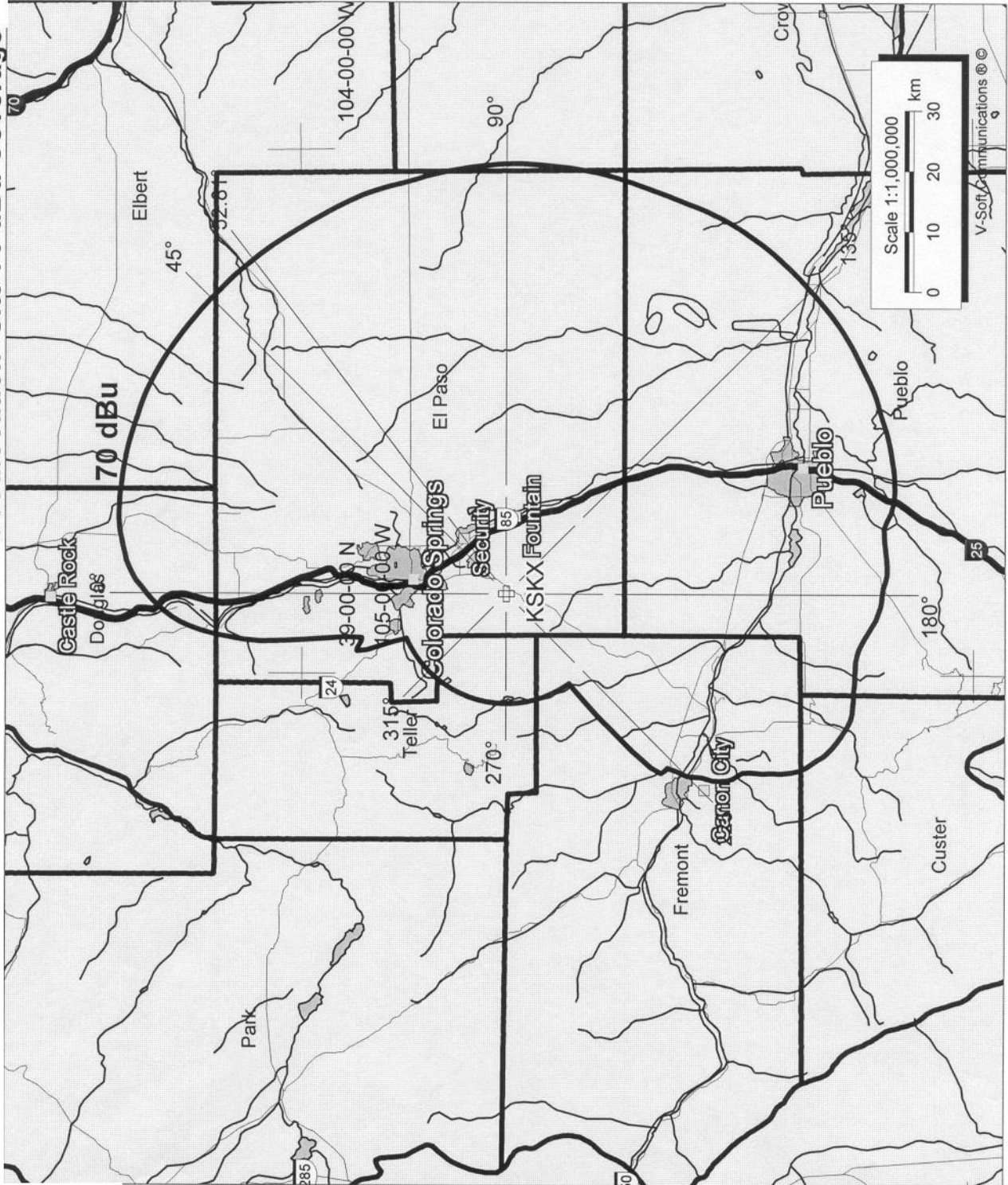
DISPLAY DATES  
 DATA 08-02-01  
 SEARCH 08-02-01

----- Channel 288 - 105.5 MHz -----

Call	Channel	Location	Dist	Azi	FCC	Margin
KSKX	LIC 288C3	Security CO	5.53	347.6	211.0	-205.47
RADD	ADD 288C3	Genoa CO	154.76	59.8	211.0	-56.24
KXKLFM	LIC 286C	Denver CO	105.14	342.9	105.0	0.14
KVAY	LIC 289C1	Lamar CO	177.14	110.9	177.0	0.14
ALLO	ADD 285A	Rye CO	86.23	184.8	75.0	11.23
A filing window for this channel will be opened in a subsequent order						
ALLO	VAC 285A	Rye CO	86.23	184.8	75.0	11.23
KALC	LIC 290C	Denver CO	119.95	343.9	105.0	14.95
ALLO	ADD 287A	Center CO	152.24	226.7	133.0	19.24
ALLO	VAC 287A	Center CO	152.24	226.7	133.0	19.24
ALLO	VAC 287C	Des Moines NM	232.27	157.2	209.0	23.27
Petrn filed by Sierra Grande B/Cing 1/12/01: R&O eff. 12/11/00.						
KWGL.C	CP 289C	Ouray CO	248.81	263.0	209.0	39.81
KWGL	LIC 289C	Ouray CO	248.81	263.0	209.0	39.81
KIMX.C	CP 288C2	Laramie WY	270.74	346.4	224.0	46.74
KRKFSM	CP 234C	Lafayette CO	121.95	333.4	41.0	80.95
KIMX	LIC 288C3	Laramie WY	292.23	350.2	211.0	81.23
One-Step Application From Channel 288A						
KZKS	LIC 287C	Rifle CO	295.58	287.2	209.0	86.58
KPMX	LIC 289C3	Sterling CO	252.04	35.3	144.0	108.04
ALLO	VAC 289C3	Sterling CO	252.04	35.3	144.0	108.04
KRKFSM	LIC 234C	Lafayette CO	158.88	344.3	41.0	117.88
*To Channel 234C, Lafayette, CO per D96-64						
KNFO	LIC 291A	Basalt CO	195.47	291.3	75.0	120.47



# C1 Allocation Site 70 dBu Coverage



**KSKX**  
 BLH 19910829KF  
 Latitude: 38-41-45 N  
 Longitude: 104-50-52 W  
 Power: 100.00 kW  
 Channel: 288  
 Frequency: 105.5 MHz  
 AMSL Height: 2432.121 m  
 HAAT = 299 M  
 Elevation: 2141.47 m  
 Horiz. Pattern: Omni

**Doug Vernier**  
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 Telecommunication Consultants  
 (515) 251-1111