

Compliance with Special Operating Conditions or Restrictions and Request for Program Test Authority

The applicant in coordination with other users of the site is committed to reducing power or ceasing operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency electromagnetic fields in excess of FCC guidelines. Further, the Applicant commits to complying with any special operating conditions or restrictions listed on the construction permit which requires no action or specific response at licensing. By means of this application, the Applicant requests Program Test Authority to use the authorized auxiliary facility as necessary.

The Applicant has installed the ERI, 2-bay, one-half wavelength spaced auxiliary antenna specified in the outstanding Application for Construction Permit. The auxiliary antenna is side-mounted below the licensed main KKFM antenna on an existing tower located on Cheyenne Mountain, a privately-owned antenna farm with approximately 40 radio towers. By definition, the KKFM main antenna will not be in operation during times the authorized KKFM auxiliary antenna is in use.

A comprehensive RF Safety Plan is in place among the Cheyenne Mountain antenna site users (including KKFM) to ensure compliance with all applicable RFR safety guidelines. Cheyenne Propagation Company commissions a complete RFR measurement survey (see attached) on a regular basis and updates the site's RF Safety Plan as necessary to assure continued compliance with the RFR safety guidelines. As indicated in the recent RFR measurement survey, the measured power density at the base of the KKFM tower (Measurement Point 55) represented only 2.2% of the occupational guideline value during times the KKFM main antenna (ERP = 71 kW) is in use. Based on worst-case calculations, this power density will be *reduced by at least 8%* during times the KKFM auxiliary facility (ERP = 16.3 kW) is in use rather than the licensed main facility. Therefore, the Applicant expects, at worst, a slight improvement in the RFR environment if the KKFM auxiliary facility must be utilized.

As demonstrated herein, the Cheyenne Mountain antenna site will remain compliant with the applicable RFR safety guidelines considering the operation of either the KKFM main antenna or the KKFM auxiliary antenna. Further, the Applicant will continue to be party to the Cheyenne Mountain RF Safety Plan and KKFM will continue to follow all necessary protocols to ensure the safety of all personnel.

RF Safety Plan

Cheyenne Mountain Antenna Site



October 23, 2016

For Cheyenne Propagation Company

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RF Safety Plan

Cheyenne Mountain Antenna Site

1.0 Executive Summary

Exposure to high levels of radio frequency energy can be harmful. Cheyenne Mountain is an antenna site with many high-power transmitters and harmful exposure is possible if precautions are not taken. To help ensure your safety, we have prepared this radio frequency safety plan. Please read the plan in its entirety and follow its recommendations.

Everyone on the site should follow these guidelines:

- All personnel entering the site must be authorized
- Obey all posted signs
- Assume all antennas are active unless proven otherwise
- Before working on an antenna, notify the owner and disable the transmitter
- Before climbing a tower, check with the site manager to determine which antennas should be de-energized, including antennas on adjacent towers.
- Place transmitters in “local” control mode when de-energized or at reduced power
- Use a radio frequency (RF) personal monitor when working near antennas
- Never operate transmitters without shields

Radio frequency power densities at ground level on Cheyenne Mountain are measured regularly and at the time of this writing are well below the FCC limit for occupational exposure. Power densities above ground can be much higher. For this reason, tower climbers should request power reductions from high-power tenants and carry RF personal monitors when climbing towers.

Please refer questions to the site manager, Mr. Jim Voige, (719) 338-4650.

2.0 Introduction

Cheyenne Mountain is a privately-owned antenna farm with approximately 40 radio towers. Cheyenne Mountain is located roughly six miles southwest of downtown Colorado Springs at an elevation of 9,440 feet above sea level. Geographical coordinates for the approximate center of the site are 38° 44' 43" N, 104° 51' 41" W (NAD 83). The 45-acre site is home to 15 television stations and 18 FM broadcast stations.

3.0 RF Exposure Standards

The possible health effects associated with exposure to radio frequency energy have been studied for more than half a century. The only established adverse effect is heating of body tissue. To protect the public from harmful exposure, the FCC requires that its licensees comply with published radio frequency exposure standards, found in Parts 1.1307 through 1.1310 of Title 47 of the Code of Federal Regulations [5]. FCC exposure limits are based on voluntary standards published by the American National Standards Institute (ANSI) and the National Council on Radiation Protection and Measurement (NCRP). FCC limits are conservative and include a safety factor of roughly 10 for occupational exposure and a safety factor of 50 for public exposure.

FCC rules apply different standards for occupational, or *controlled* environments and general population, or *uncontrolled* environments. The definitions of controlled and uncontrolled environments are as follows [5]:

Controlled Environment - “Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.”

Uncontrolled Environment - “General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.”

For controlled environments, the FCC sets a limit of 1 milliwatt/cm² in the VHF band (30-300 MHz). In the lower UHF band (300 MHz - 1.5 GHz), the FCC limit is a function of frequency and is given by the expression $f/300$ milliwatts/cm², where f is the frequency in MHz. Above 1.5 GHz, the controlled environment limit is fixed at 5 milliwatts/cm². In the broadcast radio bands (FM and TV) and personal wireless communications bands, the general population limit is exactly a factor of five below the occupational (controlled environment) limit. The FCC exposure limits are plotted as functions of frequency in Figure 1 on the next page.

The human body does not react to power densities instantaneously and short-term exposure to levels exceeding FCC power density limits does not necessarily exceed the FCC exposure limits. The FCC limits are for whole-body exposure averaged over a period of 6 minutes for controlled environments and 30 minutes for uncontrolled environments [1], [2], [5]. For example, if a radio technician working at an FM broadcast site is exposed to a power density of 0.5 milliwatts/cm² for a period of four minutes and then enters a field of 1.5 milliwatts/cm² for a period of two minutes, the average exposure in the six minute period is 0.83 milliwatts/cm² which is below the

FCC limit for controlled environments. In most locations, loiter time is not practical to control and access should be restricted wherever power densities exceed the applicable exposure limit.

Although other Federal agencies publish RF exposure standards (including OSHA), the governing standard for communications sites is the FCC standard. The FCC has prepared an easy-to-read publication explaining its RF exposure policy [6]. This publication is available from the FCC web site at www.fcc.gov.

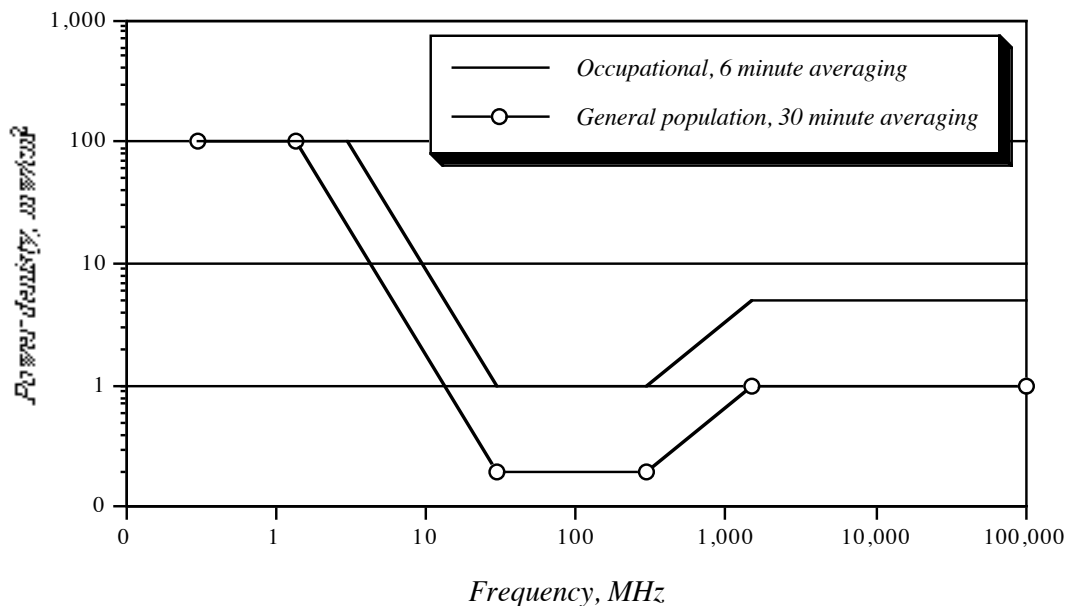


Figure 1 - FCC Exposure Standards
(Plane wave equivalent E-field power density values)

4.0 Ensuring Compliance

If the radio site has a single transmitter, one can ensure compliance by comparing the predicted power density with the FCC standard for the transmitter frequency. When the site has multiple transmitters operating over a wide range of frequencies, it becomes more difficult to ensure compliance. For example, if a tower has a paging antenna at 929 MHz and an FM broadcast antenna at 99.9 MHz, which standard do we apply, 3.1 mW/cm² or 1.0 mW/cm²?

In these situations, the FCC directs that a fraction of the standard be computed for each source. If the sum of the fractions is less than 1.0, the site is in compliance. Mathematically, this requirement is stated as

$$Q = \sum_{i=1}^M \frac{S_i}{S_{FCC}(f_i)} \leq 1.0 \quad (1)$$

where M = the number of radiating antennas at the site, S_i = the average power density from antenna i , f_i = the operating frequency of antenna i , and $S_{FCC}(f_i)$ = the FCC power density limit for frequency f_i .

On congested sites, a non-compliance condition may be caused by numerous transmitters belonging to many different licensees. The FCC recognizes that it may be impractical to assign responsibility to every transmitter contributing to the measured power density, so the Commission employs a 5% rule in these situations. In other words, only those stations that contribute 5% or more of the applicable exposure standard are responsible for correcting the problem. This rule is reproduced below from 47 CFR 1.1307(b)(3) (Oct. 1, 2016):

“(3) In general, when the guidelines specified in Sec. 1.1310 are exceeded in an accessible area due to the emissions from multiple fixed transmitters, actions necessary to bring the area into compliance are the shared responsibility of all licensees whose transmitters produce, at the area in question, power density levels that exceed 5% of the power density exposure limit applicable to their particular transmitter or field strength levels that, when squared, exceed 5% of the square of the electric or magnetic field strength.”

5.0 Procedures

The site owner, Cheyenne Propagation Company, has designated the site a controlled environment. To ensure that all personnel who travel to the site meet the FCC requirements for a controlled environment, the following restrictions and procedures are in place:

- The site is not accessible to the public. The site is 9.5 miles from Colorado Springs on a dirt road. The final 3.6 miles are behind a locked gate. A second gate at the south end of the site is only passable with issued proximity cards or PINs. There are no dwellings within several miles of the site.
- All personnel are warned of the potential radio frequency hazards. There is only one way to enter the site via vehicle and there are no hiking trails through the site. All personnel who enter the site are greeted by the sign shown in Figure 2. All areas exceeding the FCC general public exposure limit (all are guy anchors) are posted with a Blue Notice Sign and personnel can easily control their exposure by avoiding these areas.
- The site is measured regularly. The site is measured at ground level on a regular basis to ensure compliance with FCC rules. Those areas at ground level where the power density

exceeds the FCC limit for uncontrolled environment are clearly marked with FCC-approved notice and warning signs. The only locations in this category are guy anchors. At the time of this writing, there are no locations at ground level that exceed the FCC limit for occupation exposure.

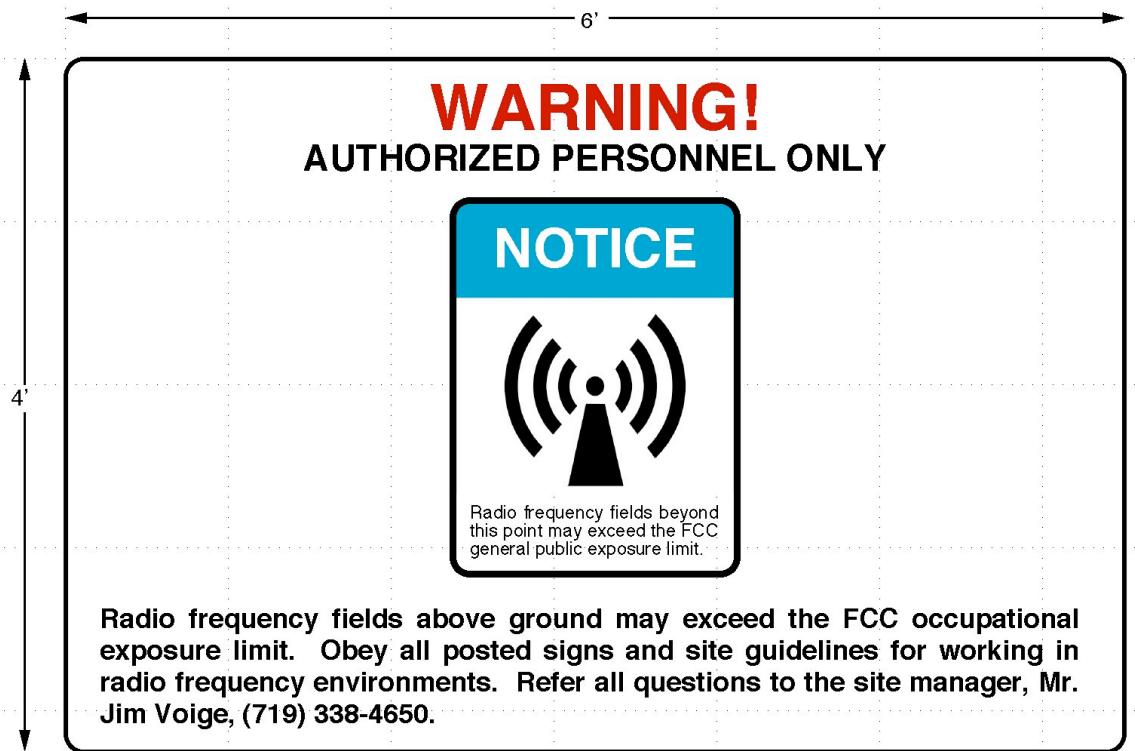


Figure 2 - Warning Sign at Entrance to Site (New as of Fall, 2016)

- Trained or Escorted Personnel Required In Certain Locations. The site owner has clearly marked all locations at ground level that exceed the public exposure limit with blue RF Notice signs. These locations tend to be guy anchors where the anchor steel re-radiates energy emitted by broadcast antennas on the tower. Thus, it is permissible for non-trained personnel to visit and work on the site at ground level *only*, but these personnel must comply with all signs.
- Power reduction guidance. Power reduction guidance is provided by the site manager when tower climbing is required. All tenants are required to make the appropriate power reductions when requested. The site manager, Mr. Jim Voige, (719) 338-4650, is available for assistance on power reduction when tower work is required.

To summarize, controlled environment exposure limits apply to Cheyenne Mountain because personnel are exposed as a consequence of their employment, they have been made fully aware

of the potential for exposure, and they can exercise control over their exposure.¹

Those towers where above-ground levels may exceed the occupational exposure limit should be marked at their base with an ANSI standard warning sign, similar to the one shown in Figure 3.



Figure 3 - Sample Warning Sign (Courtesy of Richard Tell Associates, Inc.)

Tower climbers should carry RF personal monitors (e.g., Nardalert™) to verify that transmitter power has been reduced to safe levels before working in the vicinity of high power transmit antennas.

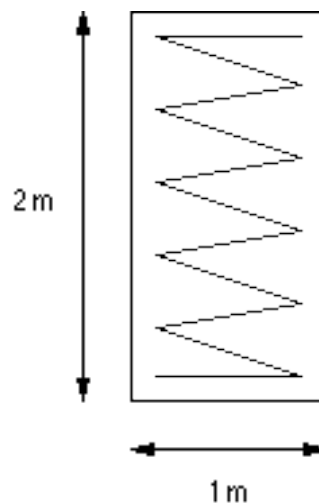
Power densities originating from towers other than the one climbed may be higher than the occupational limit. For this reason, tower climbers should check with the site manager and consult the appropriate power reduction plan before climbing any tower on the site.

Tower crews must show proof of insurance coverage and be approved by the site owner before they are allowed to work on the site. Check with Mr. Jim Voige, (719) 338-4650, for a list of approved tower rigging companies for Cheyenne Mountain.

¹ See FCC publication OET-65, edition 97-01, August 1997 for further guidance [2]. Specifically, the following paragraph from OET-65 applies to Cheyenne Mountain:

“There may be situations where RF levels may exceed the MPE limits for the general public in remote areas, such as mountain tops, that could conceivably be accessible but are not likely to be visited by the public. In such cases, common sense should dictate how compliance is to be achieved. If the area of concern is properly marked by appropriate warning signs, fencing or the erection of permanent barriers may not be necessary.”

Instrument	Serial Number	Last Calibration (2yr)
Wandel & Goltermann (W&G) EMR-300	B-0053	October, 2014
Wandel & Goltermann Type 25.1 Probe, 300 kHz - 40 GHz	B-0053	October, 2014



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Measurements are always taken at least 20 cm from reflecting objects in accordance with ANSI C95.3-2002. Magnetic field probes tend to exhibit false readings above 300 MHz. Because sources on Cheyenne Mountain include both VHF and UHF transmitters, we do not use a magnetic field probe.

During the last survey, we measured the 94 locations shown on the map of Figure 5 on the next page. The corresponding measurement values are found in the Appendix to this report. All measurements are below the occupational exposure limit.

7.0 Contact Information

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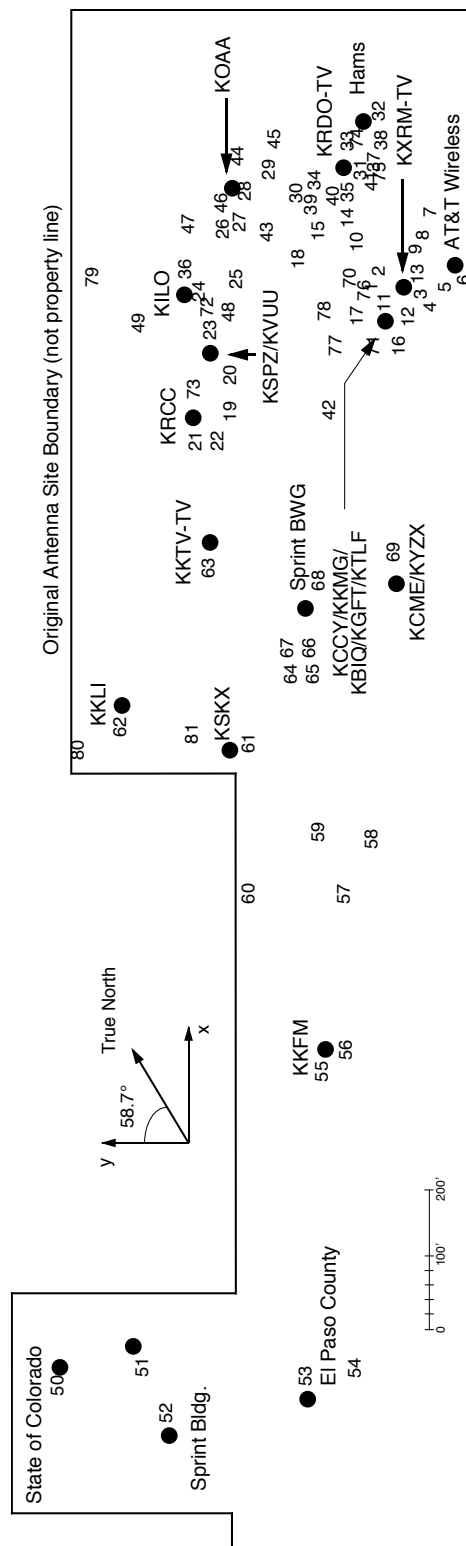


Figure 5 - Measurement Locations (See Appendix for Measurement Values) 82

8.0 References

- [1] ANSI C95.1-2005, "Safety levels with respect to human exposure to radio frequency electromagnetic fields, 3 kHz to 300 GHz."
- [2] OET Bulletin No. 65, FCC, "Evaluating compliance with FCC guidelines for human exposure to radiofrequency electromagnetic fields," Edition 97-01, August 1997.
- [3] ANSI C95.3-2002, "Recommended practice for the measurement of hazardous electromagnetic fields - RF and microwave."
- [4] ANSI C95.2-1999, "American National Standard radio frequency radiation hazard warning symbol."
- [5] Code of Federal Regulation, Title 47, Parts 1.1307 - 1.1310, October 1, 2016.
- [6] FCC OET Bulletin 56, 4th Ed., Questions and Answers about Biological Effects and Potential Hazards of Radiofrequency Electromagnetic Fields, August, 1999.

9.0 Engineer's Statement

Cheyenne Mountain
Colorado Springs, CO

This RF Safety Plan addresses electromagnetic radiation in the band 300 kHz - 300 GHz. Fields from extremely low frequency (ELF) sources, such as those emitted by 60 Hz electrical distribution lines, were not modeled. Also, induced and contact radiofrequency currents were not measured or modeled.

Tower climbers should carry portable power density meters (e.g., Nardalert™) to verify that transmitter powers have been reduced to safe levels before working in the vicinity of high power transmit antennas.

Measurements were conducted according to procedures described in ANSI Standard C95.3-2002 and the user's manual for the appropriate meter. Our conclusions are limited to those locations actually measured. All measurements were conducted with test equipment assumed to be calibrated and working properly. If new high power transmitters are installed at the site, field strength levels may change. The measurement results reported are valid as of October 18, 2016.

All representations contained herein are true to the best of my knowledge. I am a radio engineer with over thirty years experience. I hold a Bachelor of Science degree in Electrical Engineering from Virginia Tech and a Master of Science degree in Electrical Engineering from Cornell University. I am a corporate officer and stockholder of Pericle Communications Company and a Registered Professional Engineer in the State of Colorado.

Signed this 23rd day of October, 2016.

- original signed and stamped -

Jay M. Jacobsmeyer, P.E.
Colorado License #28768

Appendix - Measurements

Radio Frequency Exposure Measurements
Pericle Communications Company

Date: 10/18/16
 Project: Cheyenne Propagation Company
 Test Equipment: W&G EMR-300
 Type 25.1 Probe (Shaped)

Shaped Probe Type X Controlled
 Engineer Jacobsmeyer

No.	Location	Environment †	% of Std.
1	Bldg. 6155 KXRM front door	C	5.5%
2	KXRM tower base (south leg)	C	4.5%
3	Midway down north wall of bldg. 6155	C	1.3%
4	Bldg. 6155 transformer	C	2.3%
5	Bldg. 6157 AT&T Mobility front door (near KXRM)	C	9.1%
6	AT&T Mobility tower, south leg	C	4.5%
7	AT&T Mobility generator bldg	C	5.3%
8	KXRM east guy anchor	C	8.5%
9	Utility pole by concrete cable vault	C	4.0%
10	KXRM north guy anchor	C	3.2%
11	KXRM southwest guy anchor	C	3.9%
12	KXRM southwest guy, lengthwise	C	11.8%
13	KXRM building roof (peak location)	C	6.3%
14	Bldg. 6135 front door	C	3.1%
15	Bldg. 6145 front door	C	6.6%
16	300' self support tower, east leg	C	3.5%
17	Bldg. 6171 front door	C	0.9%
18	Bldg. 6165 front door (AT&SF, Burlington Northern)	C	3.7%
19	Bldg. 6170 front door	C	0.5%
20	Bldg. 6164 front door	C	2.2%
21	Remy tower (bldg. 6180, 6182)	C	3.9%
22	Bldg. 6182 front door	C	4.7%
23	Springs Radio tower, east leg	C	7.0%
24	Bldg. 6150 front door	C	1.1%
25	Bldg. 6140 front door (D&RG)	C	1.4%
26	Bldg. 6132 (KOAA/KTSC generator)	C	3.5%
27	Bldg. 6130 (KOAA)	C	6.1%
28	KOAA tower, south leg	C	2.4%
29	Bldg. 6120 front door (EPCSR)	C	3.5%
30	Near KRDO tower, top of hill on road	C	4.4%
31	KRDO Tower base, east leg	C	3.0%
32	Bldg. 6105 front door	C	2.1%
33	KRDO small tower in road	C	2.2%
34	KRDO fork in road	C	4.2%
35	Behind bldg. 6135	C	3.3%
36	KILO Tower	C	1.9%
37	Between KRDO Garage & 6105	C	2.9%
38	Bldg. 6127 MediaFLO Tower	C	5.2%
39	Behind bldg. 6145	C	2.4%
40	Utility pole behind bldg. 6135	C	4.4%
41	Stump above KRDO by road cutout	C	2.2%
42	Bldg. 6175 (Old, Tuff Shed Now)	C	3.6%
43	KOAA south guy anchor	C	4.2%
44	KOAA northwest guy anchor	C	1.0%
45	KOAA northeast guy anchor	C	3.0%
46	KOAA fuel tank, southwest corner	C	0.5%
47	KILO northeast guy anchor	C	7.1%
48	KILO southeast guy anchor	C	4.8%
49	KILO southwest guy anchor	C	7.4%
50	Bldg. 6570 State of Colorado tower	C	0.4%

† U = uncontrolled environment, C = controlled environment
 All measurements are spatial averages.

No.	Location	Environment †	% of Std.
51	HAMS tower (bldg. 6550)	C	1.3%
52	Bldg 6560 GTE Sprint tower	C	0.5%
53	Bldg. 6565 El Paso County tower	C	1.3%
54	Bldg. 6545 U.S. Army tower	C	1.3%
55	KKFM tower base, west side	C	2.2%
56	Bldg. 6291 front door (KKFM)	C	1.0%
57	Bldg. 6275 Mountain Communications tower	C	1.7%
58	Bldg. 6273 GTE Airphone	C	0.0%
59	Bldg. 6265 Door	C	0.2%
60	Bldg. 6260 (Lojack) Door	C	1.5%
61	KOAA-DT Tower	C	1.8%
62	KKLI tower east leg (107.9 FM)	C	3.5%
63	KKTV tower	C	0.6%
64	Bldg. 6245 Arch Paging front tower	C	3.3%
65	Bldg. 6245 Arch Paging back tower	C	2.3%
66	Bldg. 6235 Comm. Solutions back of bldg.	C	1.2%
67	Bldg. 6235 Comm. Solutions front tower	C	2.2%
68	Bldg. 6233Sprint BWG Tower, east leg (old tower)	C	5.3%
69	Bldg. 6225 KCME tower east leg (safety cable)	C	8.6%
70	Bldg. 6155 KXRM, 20' north of door	C	11.0%
71	Bldg. 6167 KTSC Channel 8 Front Door	C	0.3%
72	Bldg. 6160 Front Door	C	1.9%
73	Bldg. 6180 KRCC	C	8.6%
74	Bldg. 6115 KRDO DTV	C	2.1%
75	Bldg. 6127 MediaFLO Front Door	C	3.9%
76	Bldg. 6155 KXRM, road by Qwest post	C	5.8%
77	Bldg. 6185	C	2.3%
78	Bldg. 6173 T-Mobile Microwave Building	C	3.1%
79	KKTV North Guy Anchor	C	6.0%
80	KKTV SW Guy Anchor	C	1.6%
81	Bldg. 6236 KOAA DTV	C	0.9%
82	New 250' DTV Tower (Entravision Ch. 48) SW Leg	C	5.5%
83	New 250' DTV Tower (Entravision Ch. 48) NW Leg	C	5.4%
84	Bldg. 6189 (Channel 48)	C	1.9%
85	Union Pacific Tower SE Guy Anchor	C	20.6%
86	UP Tower SW Guy Anchor	C	19.2%
87	UP Tower N Guy Anchor	C	80.3%
88	KKFM Tower N Guy Anchor	C	12.9%
89	KKFM Tower E Guy Anchor	C	54.9%
90	Bldg 6191 (Lesea) Door	C	0.5%
91	Bldg 6225 (KCME)	C	6.3%
92	KKTV SE Guy Anchor	C	2.7%
93	Bldg. 6240	C	1.2%
94	Bldg. 6228	C	0.3%

† U = uncontrolled environment, C = controlled environment
All measurements are spatial averages.