

20  
10  
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## TOWER FACE AREA ANALYSIS

### 1. Existing tower

Face area of the existing tower was determined from dimensions found in "*Structural Analysis Report: Existing 120' Self-Support Tower, Manufacturer is Unknown, Located at Eldorado Mountain, CO, for Pinnacle Towers, Inc*", by Michael T. De Boer, P.E., June 21, 2000, and submitted to Jeffco Zoning Administrator by PTI via letter dated July 6, 2000 (attached), as follows:

1. Lower section -  $\frac{1}{2} \times (17.8' + 8.0') \times 80' = 1,032$  s.f.
2. Middle section -  $8' \times 40' = 320$  s.f.
3. Top section -  $\leq 8' \times 40' = 320$  s.f.
4. Total Face Area  $\leq 1,672$  s.f. for 160-ft high existing tower.

### 2. Illustrative 420-foot tower

Face area of the illustrative 420-ft tower (36-ft wide base) was determined from dimensions scaled off of *Drawing A4-40* and *Drawing A1-20* in PTI's amended application dated December 7, 2001, as follows

1. Lower section -  $\frac{1}{2} \times (36' + 12') \times 177' = 4,248$  s.f.
2. Middle section -  $12' \times 123' = 1,476$  s.f.
3. Upper section -  $5' \times 120' = 600$  s.f.
4. Total Face Area = 6,324 s.f. total for 420-ft high illustrative tower.

### 3. Allowable 450-foot and 180-foot towers

The maximum face area allowed by the ODP is constrained only by the maximum tower height of 450 feet, and the maximum 45-ft width of the tower at the base. Ten-foot extensions are allowed on each side of a tower face, allowing a 65-ft maximum possible width at the tower base.

The shape of the tower is not specified by the ODP, so this analysis assumes that the tower can remain at the same width as the base for its entire height.

**Face area of the proposed allowable 450-foot tower is 20,250 s.f. (45'x450'), or 29,250 s.f. (65'x450') if the 10' extensions allowed on each side of a tower face are included (assumes tower width does not increase with height).**

The ODP also allows the existing tower to be replaced with a tower that is 45 feet wide at the base and 180 feet tall. **Face area of the proposed allowable replacement 180-foot tower is 8,100 s.f. (180'x45'), or 11,700 s.f. (180'x65') if the 10' extensions allowed on each side of a tower face are included (assumes tower width does not increase with height).**

#### 4. Face Area Increase

Existing tower face area is estimated to be 1,672 s.f. If PTI's proposal were approved, tower face area would be allowed to increase as follows:

1. Add illustrative 420-foot tower, leave existing tower
  - a. Original tower face area: 1,672 s.f. (see section 1 above)
  - b. New tower face area: 6,324 s.f. (see section 2 above)
  - c. Ratio of new tower face area to old tower face area:  $3.8 = 6,324/1,672$
  - d. Total factor of increase:  $4.8 = (6,324 + 1,672)/1,672$
  
2. Add allowable 450'x45' tower, leave existing tower
  - a. Original tower face area: 1,672 s.f. (see section 1 above)
  - b. New tower face area: 20,250 s.f. = 450'x45'
  - c. Ratio of new tower face area to old tower face area:  $12.1 = 20,250/1,672$
  - d. Total factor of increase:  $13.1 = (20,250 + 1,672)/1,672$
  
3. Add allowable 450'x45' tower with allowable 10' extensions on each side of tower face, leave existing tower
  - a. Original tower face area: 1,672 s.f. (see section 1 above)
  - b. New tower face area: 29,250 s.f. = 450'x65'
  - c. Ratio of new tower face area to old tower face area:  $17.5 = 29,250/1,672$
  - d. Total factor of increase:  $18.5 = (29,250 + 1,672)/1,672$
  
4. Add allowable 450'x45' tower, replace existing tower with 180'x45' tower
  - a. Original tower face area: 1,672 s.f. (see section 1 above)
  - b. New tower face area: 28,350 s.f. = 450'x45' + 180'x45'
  - c. Ratio of new tower face area to old tower face area:  $17.0 = 28,350/1,672$
  - d. Total factor of increase:  $18.0 = (28,350 + 1,672)/1,672$
  
5. Add allowable 450'x45' tower with allowable 10' extensions on each side of tower face, replace existing tower with 180'x45' tower with allowable 10' extensions on each side of tower face
  - a. Original tower face area: 1,672 s.f. (see section 1 above)
  - b. New tower face area: 40,950 s.f. = 450'x65' + 180'x65'
  - c. Ratio of new tower face area to old tower face area:  $24.5 = 40,950/1,672$
  - d. Total factor of increase:  $25.5 = (40,950 + 1,672)/1,672$

#### 5. Conclusion

Tower face area could increase by a factor of 4.8 for the illustrative tower, to as much as a factor of 25.5 for the maximum sized towers allowed by the ODP.

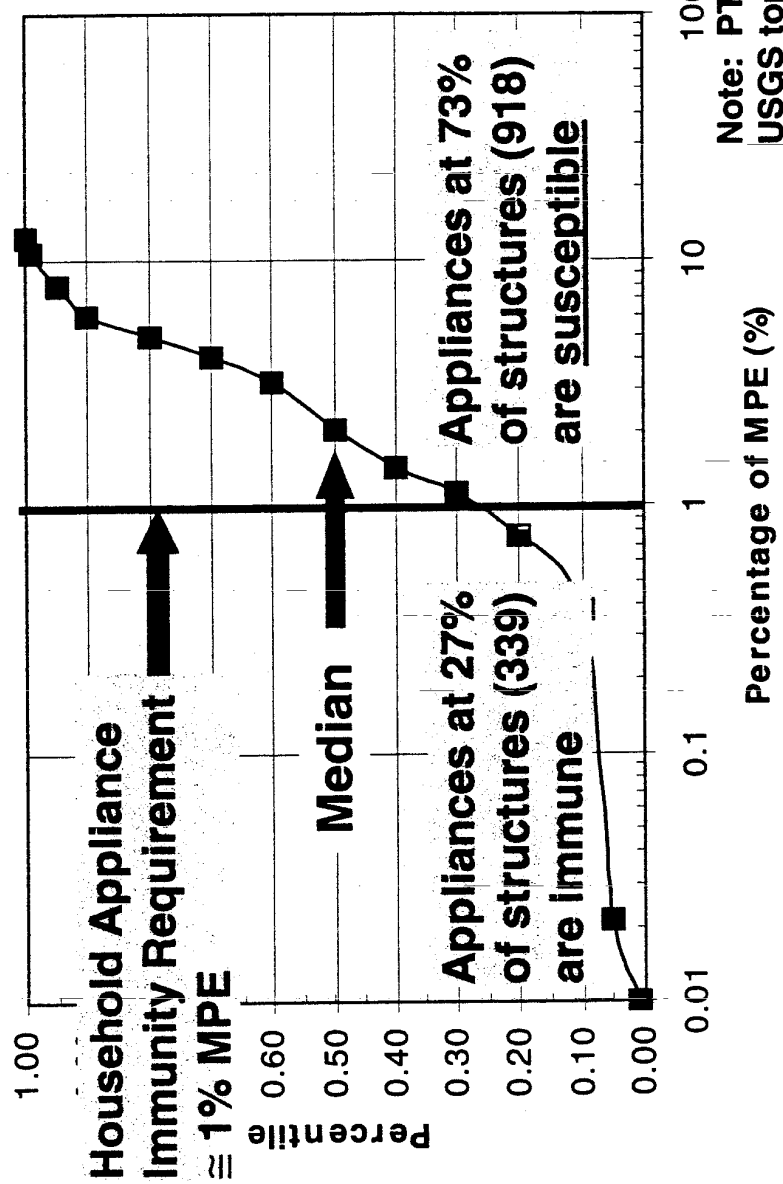
# Interference

## Contents

1. Slides from PTI presentation at the Planning Commission hearing on November 7, 2001. Establishes a relationship between MPE and potential interference to household appliances, and shows that 73% of structures in the Coal Creek Canyon area would be susceptible to interference.
  - a. Blanketing Interference Analysis: PTI-provided interference standards express both MPE and immunity requirements for household appliances in terms of Power Density. Household Immunity Requirement  $\cong$  1% MPE.
  - b. Statistical Data: PTI-provided analysis showing that 73% of surrounding structures would be subject to RF levels of 1% MPE or greater, and thus would be susceptible to interference to household appliances.
  - c. Comprehensive Location Analysis: PTI-provided analysis showing in map view the areas that would be subject to RF levels of 1% MPE or greater, and thus would be susceptible to interference to household appliances. Shows that most of the Coal Creek Canyon area would be susceptible to interference to household appliances.
2. Review of amended ODP, prepared for Jefferson County by Hartech, Inc.
  - Reiterates that FCC regulations regarding interference apply only to radio and TV receivers.
3. Excerpts from PTI ODP dated December 7, 2001
  - Section G.3.i, states that nothing in the ODP shall limit the number of broadcast facilities which can be placed at the site.
  - Section J.7.a, states that mitigation for interference will only be done consistent with FCC regulations.

# Some Statistical Data on RF Field Analysis

Cumulative Percentile of Structure Locations with RF Fields  $\leq$  X% MPE



Maximum field  
12.5% MPE

99th percentile  
10.9% MPE

50th percentile  
2.1% MPE

27th percentile 1% MPE  
10th percentile  
0.39% MPE

Note: PTI identified 1,257 structures from USGS topo (ca. 1990). Actual number of structures is now higher.



Slides from PTI presentation (11/7/01); Annotations by CCCHOA

Blanketing Interference Analysis						
STANDARD	APPLICATION	FREQUENCY RANGE	Power Density mW/cm <sup>2</sup>	Power Density W/m <sup>2</sup>	Electrical Field V/m	Electrical Field dBu
<b>MPE</b> (Max. Permissible Exposure)	Hazard to General Population	30 MHz - 300 MHz	<b>0.2</b>	2	2.7	149
EN 5013-4	Immunity Requirement for alarm system	80 MHz - 1000 MHz	0.027	0.27	10	140
<b>EN 55104</b>	Immunity Requirement for Household appliances, tools and toys	0 - 400 GHz	<b>0.0024</b>	0.024	3	130
Blanketing	General interference from FM Broadcast	88 MHz - 108 MHz	0.000084	0.00084	0.56	115

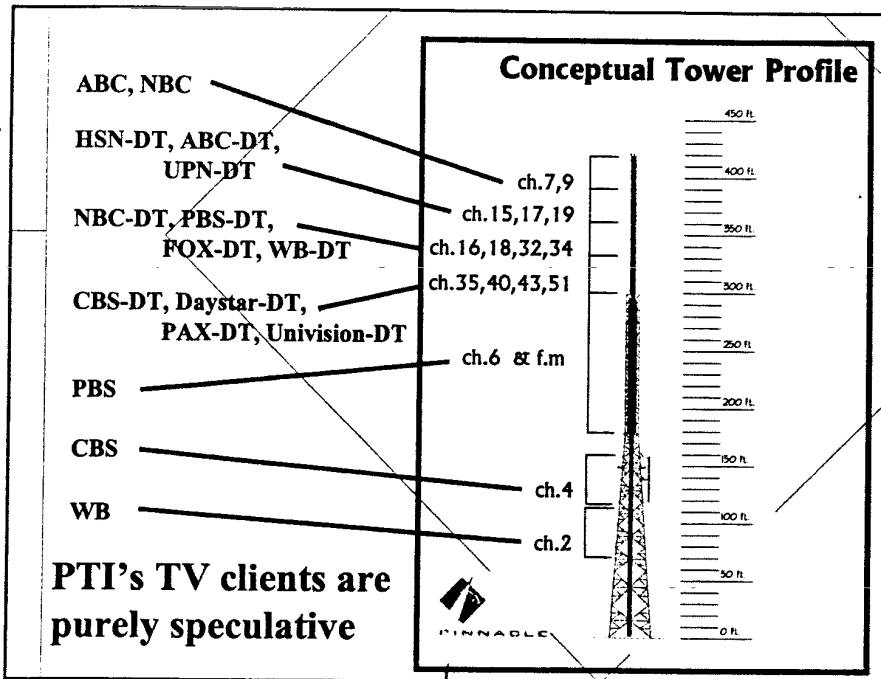
look in sides

1. **MPE standard (and PTI RF Analysis) is based on Power Density**
  2. **PTI-provided interference standard also expressed as Power Density**
  3. **PTI has thus provided a relationship between interference and MPE**
- Household Appliance Immunity Requirement (EN55104)  $\approx$  1% MPE**

Analog TV

Denver's entire 11-station HDTV market!

Analog TV



From Pinnacle's application

PTI appears to have no clients in the Denver TV broadcast market

Network	Chan	Client
WB	2, 34	NO
CBS	4, 35	NO
PBS	6, 18	NO
ABC	7, 17	NO
NBC	9, 16	NO
HSN	14, 15	BCDC

Network	Chan	Client
UPN	20, 19	NO
FOX	31, 32	NO
Daystar	41, 40	NO
Univision	50, 51	NO
PAX	59, 43	BCDC

BCDC - Mt. Morrison proposal