

**Station KGO-TV • Channel 7 • San Francisco, California**  
**Proposed DTV Booster Facility for Evaluation Under FCC SFTA**

**Statement of Hammett & Edison, Inc., Consulting Engineers**

The firm of Hammett & Edison, Inc., Consulting Engineers, has been retained by Sutro Tower, Inc., San Francisco, California, on behalf of the licensee of Station KGO-TV, Channel 7, San Francisco, California (FCC Facility ID No. 34470) to prepare engineering materials describing a proposed Special Field Test Authorization (SFTA) for a digital television (DTV) booster/repeater system to serve South San Francisco, California, and the immediately surrounding area.

**Background**

A field reception survey of the eleven TV broadcast stations operating from Sutro Tower<sup>1</sup> was conducted in late 2009 to evaluate coverage of post-transition digital transmitting facilities. Over 40 distinct locations throughout the San Francisco Bay Area were evaluated in two project phases. The results of those surveys showed that one area in South San Francisco, about 12 kilometers south-southeast of the main transmitter site, exhibited no reception for any of the Sutro Tower TV facilities, even though normally adequate signal field strengths were observed. A second nearby location exhibited marginal or no reception of the same stations. Subsequent analysis of recorded spectrum analyzer and demodulator data indicated that reception in those areas is blocked from line-of-sight coverage, with available signals being severely distorted by multipath propagation. Terrain-sensitive propagation modeling was conducted to determine if a practical fill-in signal repeater or booster could be implemented in the identified outage area, yielding the facilities proposed below.

**Proposed DTV Booster Facility**

Accompanying Figure 1 provides engineering specifications for a KGO-TV on-channel booster facility proposed for evaluation under SFTA, as codified in §73.1515 of the FCC Rules. As shown, a Kathrein-Scala Model 2HDCA-10CP/RM circularly-polarized dual Yagi antenna<sup>2</sup> would be installed on the tower used by TV Station KNTV at the San Bruno Mountain communications site. The antenna would be oriented toward 151°T, and would include 4.6° of mechanical beam tilt to place the main beam in the heart of the observed outage area. Using a maximum power of 4.5 kW ERP, propagation calculations show that the proposed booster facility would be capable of providing an undistorted signal that would overcome the presently distorted signal in that area by at least 15.5 dB.<sup>3</sup>

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<sup>1</sup> Sutro Tower hosts the following full-service TV broadcast facilities: Station KGO-TV, Channel 7; Station KOFY-TV, Channel 19; Station KPIX-TV, Channel 29; TV Station KQED, Channel 9; Station KMTP-TV, Channel 33; Station KFSF-DT, Channel 34; Station KRON-TV, Channel 38; TV Station KCNS, Channel 39; Station KCSM-TV, Channel 43; TV Station KTVU, Channel 44; and TV Station KBCW, Channel 45.

<sup>2</sup> The antenna azimuth pattern plot, azimuth pattern tabulation, and elevation pattern plot are provided in accompanying Figure 2.

<sup>3</sup> ATSC Document A/74, *ATSC Recommended Practice: Receiver Performance Guidelines*, April 7, 2010, Table 5.1 and related text at pp. 13-14 (Co-Channel Rejection).



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This power level is specified as a maximum limit; all field evaluations of booster performance will be conducted at or below this power level.

**Coverage and Interference Considerations**

The map of accompanying Figure 3A shows the plotted F(50,90) 36 dBu noise-limited and 48 dBu coverage contours of the main facility and the proposed booster, respectively, as based on maximum ERP requested for the booster facility.<sup>4</sup> Due to the significant mechanical beam tilt of the booster transmitting antenna, practical coverage is limited to the shadowed area shown in Figure 3B, with booster coverage outside that area predicted to fall to equal or less than the signal strength provided by the main station.

To prevent excessive energy within the adjacent spectrum, the booster transmitter will employ a full-service interference mask. The closest first-adjacent-channel facility is TV Station KSBW, Channel 8, Salinas, California (FCC Facility ID No. 19653), located 132.2 kilometers at bearing 141.1° from the booster site. Because the booster coverage contour is well contained within the KGO-TV main contour, no interference to KSBW reception is anticipated. However, booster testing will be coordinated with the KSBW licensee in the unlikely event that interference reports are received.

**Environmental Factors**

Grant of the proposed SFTA facilities would not constitute a major environmental action. The proposed transmitting antenna will be side-mounted on an existing tower that has been registered with the Commission (ASR No. 1010567), with no change in the overall height of the structure. The tower is part of an existing communications site, and no FCC Rules §1.1307 conditions, defining major environmental actions, are believed to apply.

The proposed operation would comply with FCC guidelines regarding human exposure to radio frequency energy. Calculations performed in accordance with FCC OET Bulletin No. 65 (August 1997) show that the proposed facility, when combined with a similar facility proposed for UHF operation<sup>5</sup> and the licensed TV Station KNTV transmitting facilities would produce less than 20% of the applicable power density limit for continuous public exposure at a calculation height of 2 meters above ground level. The KNTV tower is the southern-most tower located at the San Bruno Mountain communications site and is separated from the next tower to the north by 180 meters, so the additive effects of other facilities located near the KNTV tower are negligible.

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<sup>4</sup> The projected F(50,90) 36 dBu contour of the proposed booster facility is also fully contained within the noise-limited contour of the main facility.

<sup>5</sup> A similar request for SFTA to evaluate a booster facility for Station KPIX-TV, Channel 29 (Virtual Channel 5), San Francisco, California (FCC Facility ID No. 25452) is expected to be filed simultaneously with this request.



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**Proposed Operation, Waiver Requests, and Reporting**

The proposed booster is to be fed via microwave (using facilities obtained under separate authorization) and synchronized with the data stream of the main facility in accordance with ATSC recommendations. Because such synchronization is required for proper field evaluation of booster performance, waiver of §73.1515(c)(2), requiring unmodulated carrier transmission, is respectfully requested. Due to the relatively low transmitter power involved, waiver of §73.1515(c)(4), requiring logging of transmitter power at half-hour increments, is also requested. Modern low power DTV transmitters<sup>6</sup> are inherently stable with respect to maintaining output power; however, a log will be kept of transmitter power employed and associated changes during all phases of booster performance evaluation. Finally, the booster facility will be operated only during times during which field testing is to occur.

Booster evaluation testing will occur during daytime hours using a mobile vehicle having an extendable mast with calibrated receiving antenna and appropriate test equipment, including a commercial ATSC demodulator and spectrum analyzer. In addition to the booster coverage area depicted in the Figure 3B map, surrounding areas will be evaluated for potential booster-into-main signal interference potential. A report of findings, as required by §73.1515(c)(7) of the rules, will be prepared and submitted to the Commission at the conclusion of testing. It is respectfully requested that a period of at least six months be authorized for SFTA, such that sufficient time is available for facility hardware procurement, construction and evaluation.

**Pending Application for KGO-TV Fill-In Translator**

Station KGO-TV has a pending application, FCC File No. BDRTCDT-20090824AIJ, to construct a permanent fill-in translator to serve San Jose, California, and the surrounding area. While this proposed translator shares some service area commonality with the proposed booster, it is not intended to duplicate regular service to the proposed booster coverage area.

**Conclusion**

Grant of the requested SFTA for assessment of the proposed DTV booster facility will allow thorough evaluation of a potential resolution of an identified coverage loss area that is well contained within the KGO-TV main service area. A successful test outcome likely will result in a request for permanent operation of booster facilities for some or all of the eleven TV stations presently operating from the Sutro Tower transmitting facility.

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<sup>6</sup> A transmitter that complies with FCC equipment rules and standards will be employed.



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**List of Figures**

In carrying out these engineering studies, the following attached figures were prepared under my direct supervision:

1. Engineering specifications of proposed South San Francisco booster facility
2. Proposed DTV booster transmitting antenna
3. Coverage and shadow maps of proposed DTV booster operation.

January 18, 2011



  
Stanley Salek, P.E.



**Station KGO-TV • Channel 7 • San Francisco, California**

**Engineering Specifications of Proposed South San Francisco DTV Booster**  
**Main Facility: Station KGO-TV, FCC File No. BMPCDT-20090623AAU,**  
**Facility ID No. 34470**  
**(Pending License Application File No. BLCDT-20090824ADG)**

**A. Tower**

FCC Tower Registration No.	1010567	
KNTV Tower, San Bruno Mountain antenna farm, 900 Radio Road, Daly City, San Mateo County, California		
Geographical Coordinates	<u>ASR: (NAD-83)</u>	<u>CDBS (NAD-27)</u>
	37° 41' 06.7" N	37° 41' 06.9" N
	122° 26' 04.5" W	122° 26' 00.6" W
Elevation of site above mean sea level	381.0 m	
Overall tower height above ground level	87.8 m	
Overall tower height above mean sea level	468.8 m	

**B. Effective Heights**

Height of radiation center above ground level	15.2 m
Height of radiation center above mean sea level	396.2 m
Height of radiation center above average terrain (based on KNTV average terrain of record)	329.4 m

**C. Antenna System**

Make/model	Scala, Model 2HDCA-10CP/RM	Dual Yagi
Antenna pattern		Narrow Beam Directional
Orientation		151°T
Polarization		circular
Electrical beam tilt		none
Mechanical down tilt		4.6° toward 151°T

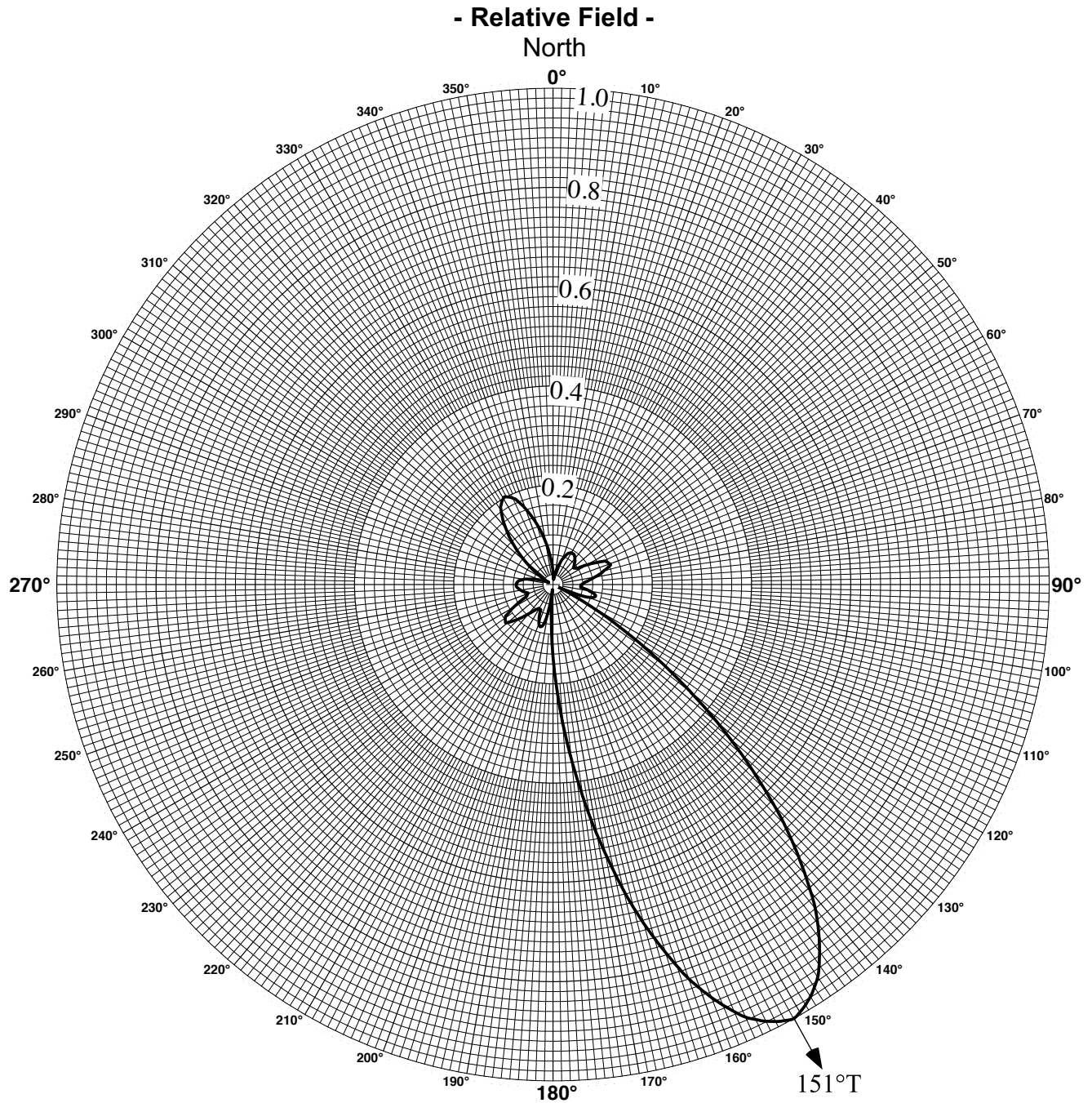
**D. Operation**

Channel	D07
Transmitter emission mask	Full Service
Maximum antenna input power (DTV average)	500 W
Antenna gain	8.91
Maximum effective radiated power	4.5 kW



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**Azimuth Pattern and Orientation of Proposed  
Kathrein-Scala Model 2HDCA-10CP/RM Transmitting Antenna  
Circularly Polarized**



Pattern data provided by manufacturer.



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Figure 2A

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**Azimuth Pattern Tabulation  
Kathrien-Scala Model 2HDCA-10CP/RM Transmitting Antenna**

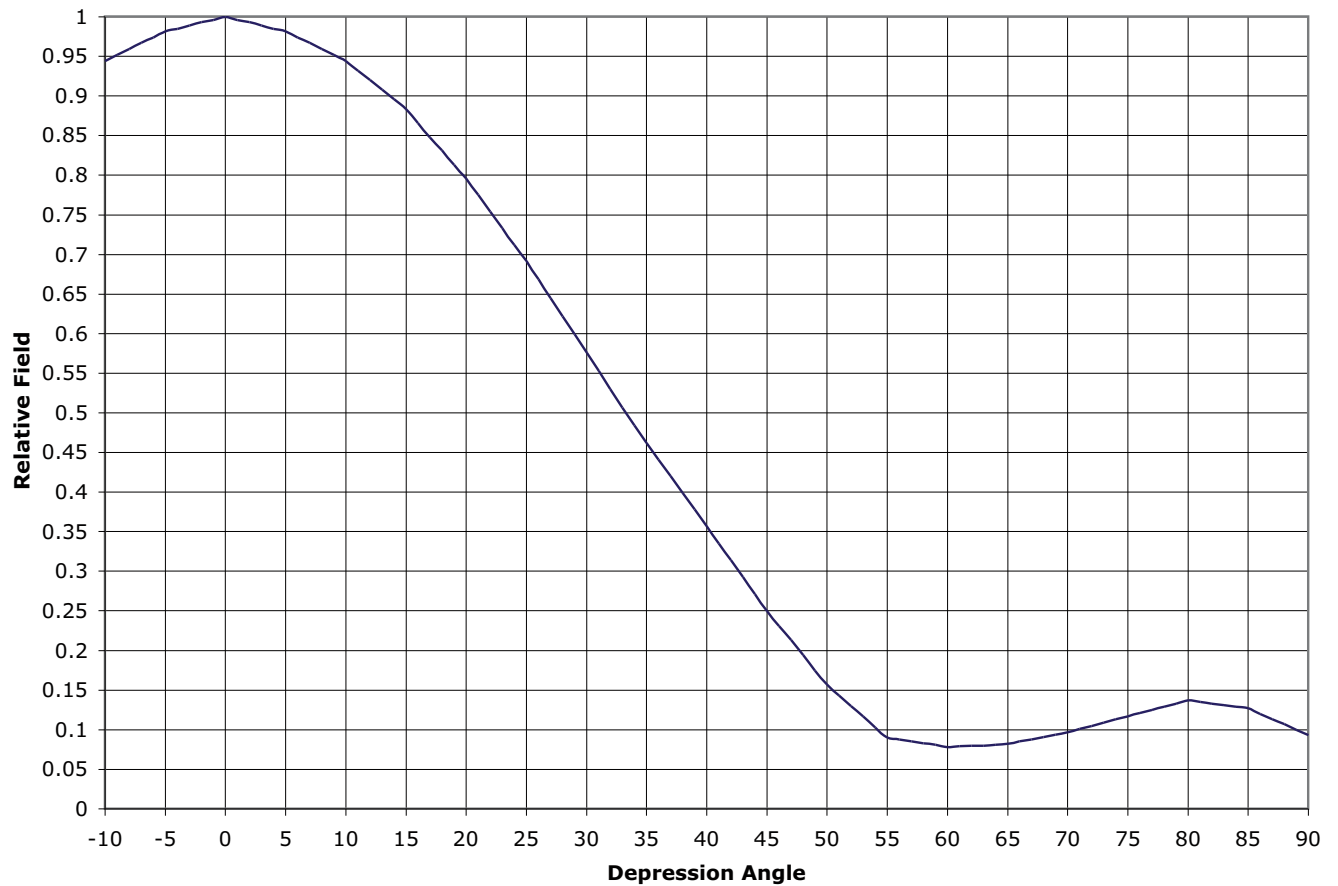
<u>Azimuth</u>	<u>Relative Field</u>
0	1.000
10	0.840
20	0.473
30	0.117
40	0.066
50	0.078
60	0.056
70	0.081
80	0.123
90	0.086
100	0.053
110	0.067
120	0.074
130	0.057
140	0.020
150	0.021
160	0.081
170	0.156
180	0.202
190	0.156
200	0.081
210	0.021
220	0.020
230	0.057
240	0.074
250	0.067
260	0.053
270	0.086
280	0.123
290	0.081
300	0.056
310	0.078
320	0.066
330	0.117
340	0.473
350	0.840

- Notes: 1. Normalized pattern; pattern to be rotated to 151°T.  
2. Pattern data provided by manufacturer.



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Elevation Pattern Plot  
Kathrein-Scala Model 2HDCA-10CP/RM Transmitting Antenna



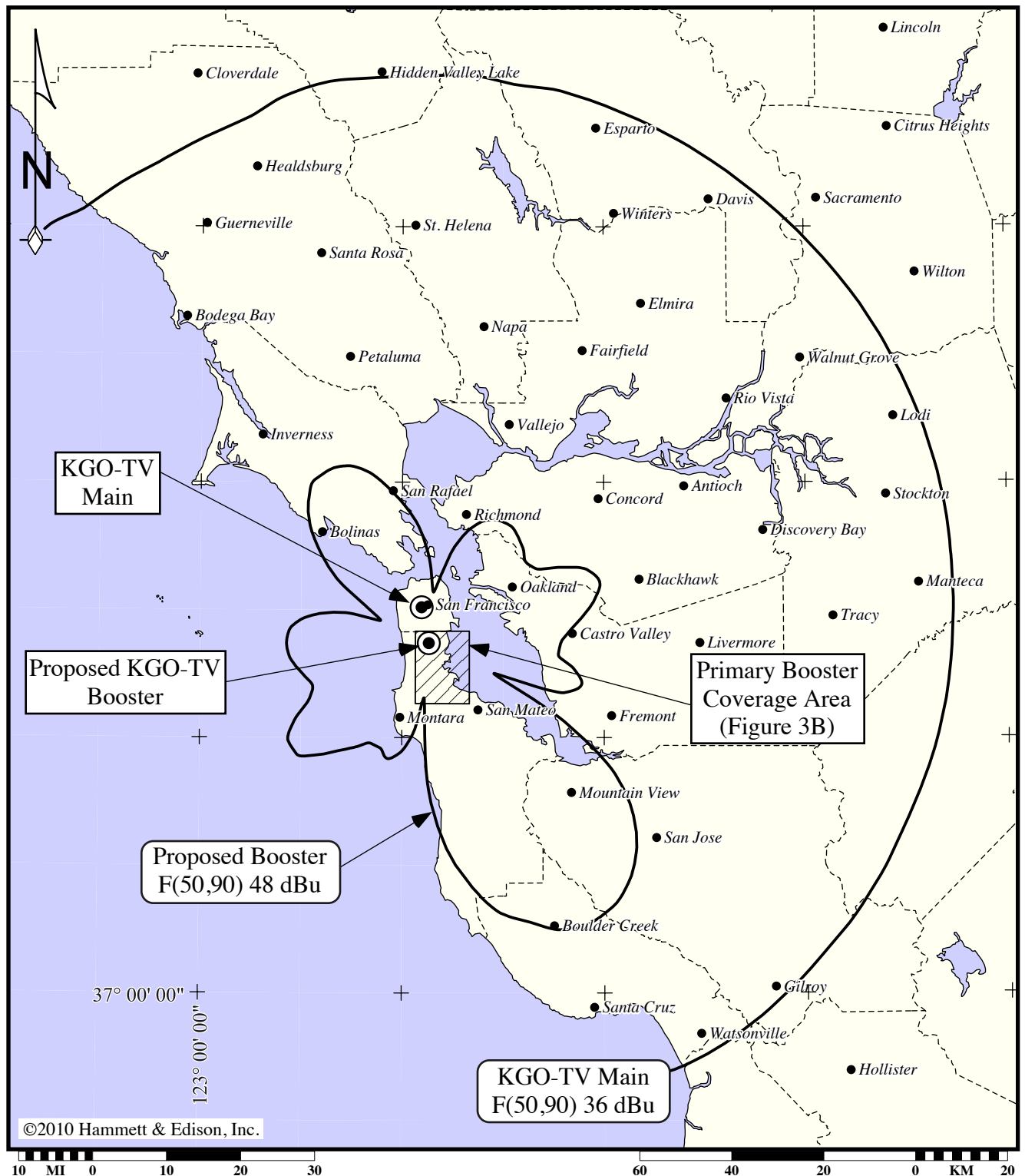
Pattern data provided by manufacturer.





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## Projected Coverage of Main Station and Proposed Booster Station



Lambert conformal conic map projection. Map data taken from Sectional Aeronautical Charts, published by the National Ocean Survey. Geographic coordinate marks shown at 30-minute increments. City names and county lines shown taken from U.S. Census Bureau TIGER/Line 2000 data.



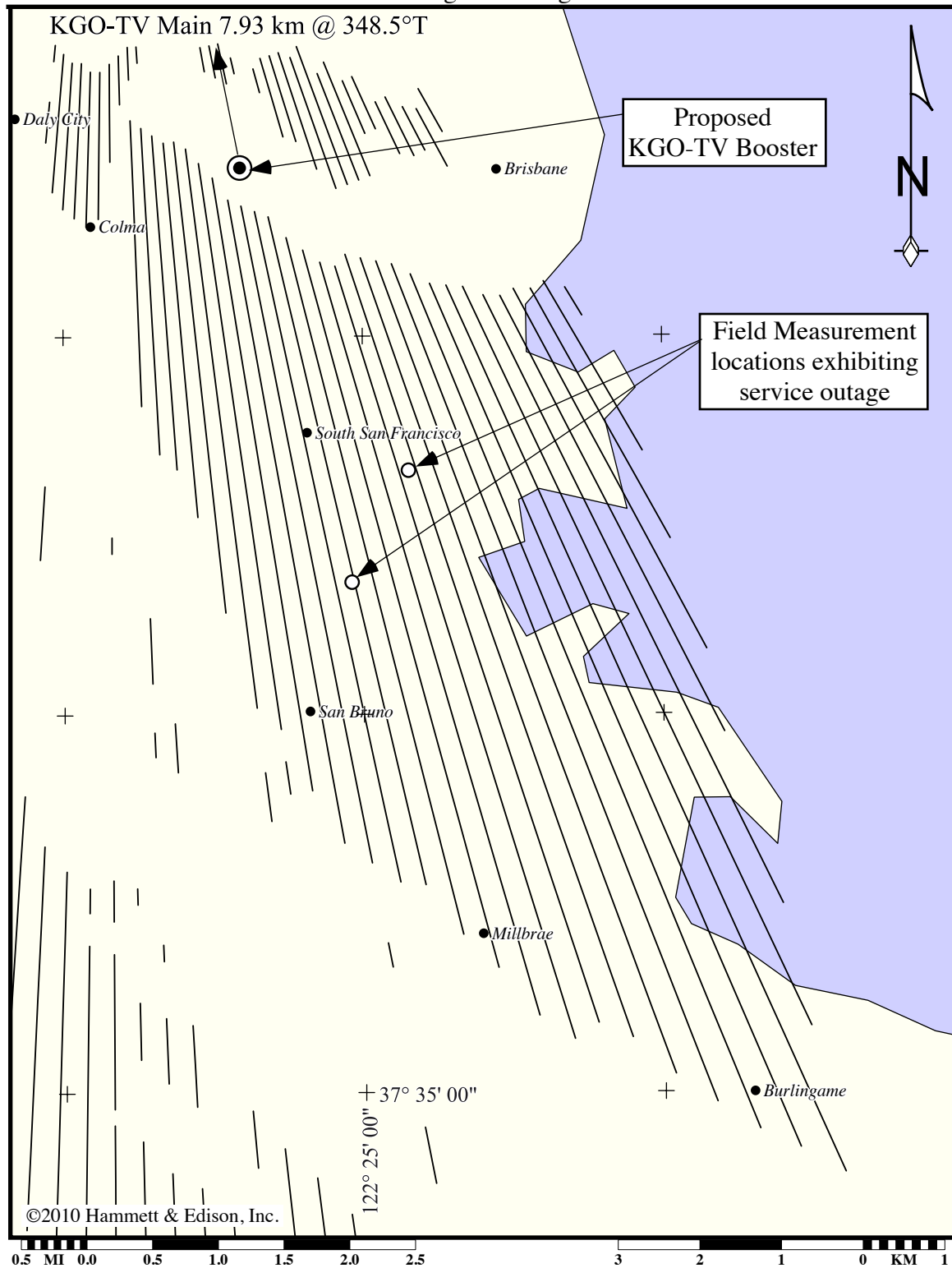
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Figure 3A

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Shadow Map of Proposed Primary Booster Coverage Area

Lines Indicate Line-of-Sight Blockage of Main Station



Traverse Mercator map projection. Map data taken from Sectional Aeronautical Charts, published by the National Ocean Survey. Geographic coordinate marks shown at 2-minute 30-second increments. City names shown taken from U.S. Census Bureau TIGER/Line 2000 data.



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Figure 3B