

## **ENGINEERING EXHIBIT**

### **Digital Low Power Television Station Application for Minor Modification of Licensed Facility**

prepared for

#### **Jeff Chang**

KPJC-LD San Francisco, CA

Facility ID 182962

Ch. 11 0.059 kW Directional

*Jeff Chang* (“*Chang*”) is the licensee of digital Low Power Television station KPJC-LD, Channel 11, Facility ID 182962, San Francisco CA. KPJC-LD is licensed to operate (file# 0000117056) from a rooftop transmitting location with 0.07 kW effective radiated power (“ERP”), directional. *Chang* herein seeks a minor modification Construction Permit to relocate KPJC-LD to an established mountaintop site, decrease ERP to 0.059 kW, and utilize a different directional antenna.

The proposed KPJC-LD facility will employ a new antenna to be side-mounted on the existing tower structure associated with FCC Antenna Structure Registration number 1010566, located at San Bruno Mountain 11.8 km (7.3 miles) from the licensed site. No change to the overall structure height is proposed.

The proposed antenna is a Dielectric model THA-C2-2H/4H-1-VP having elliptical polarization. The horizontally ERP is 0.059 kW and the vertically polarized ERP is 0.047 kW using a “full service” out of channel emission mask. A plot of the directional antenna’s azimuthal pattern is supplied in Figure 1. Figure 2 depicts the 48 dB $\mu$  coverage contour of the proposed facility as well as that of the licensed KPJC-LD, demonstrating compliance with §73.3572 for a minor change.

Interference study per OET Bulletin 69<sup>1</sup> shows that the proposal complies with the FCC’s interference protection requirements toward all digital television, television translator, LPTV, and

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<sup>1</sup>FCC Office of Engineering and Technology Bulletin number 69, *Longley-Rice Methodology for Evaluating*

Class A stations. FCC processing of this proposal is requested using a 1.0 km cell size and 0.1 km terrain profile increment. The results, summarized in Table 1, show that any new interference does not exceed the FCC's interference limits (0.5 percent to full power and Class A stations, and 2.0 percent to secondary stations) to any facility.

### **Human Exposure to Radiofrequency Electromagnetic Field**

The proposed operation was evaluated for human exposure to RF energy using the procedures outlined in the FCC's OET Bulletin Number 65. Based on OET-65 equation (10) and considering the worst-case of 100 percent antenna relative field in downward elevations, the calculated signal density near the tower at two meters above ground level attributable to the proposed facility is  $4.4 \mu\text{W}/\text{cm}^2$ , which is 2.2 percent of the general population/uncontrolled maximum permitted exposure limit. This is below the five percent threshold limit described in §1.1307(b) regarding sites with multiple emitters, categorically excluding the applicant from responsibility for taking any corrective action in the areas where the proposal's contribution is less than five percent. When the antenna's elevation pattern is considered, the calculated signal density will be even lower.

The general public will not be exposed to RF levels attributable to the proposal in excess of the FCC's guidelines. RF exposure warning signs will be posted. With respect to worker safety, the applicant will coordinate exposure procedures with all pertinent stations and will reduce power or cease operation as necessary to protect persons having access to the site, structure, or antenna from RF electromagnetic field exposure in excess of FCC guidelines. Environmental matters covered by this exhibit are limited to the evaluation of exposure to RF electromagnetic field.

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*TV Coverage and Interference*, February 6, 2004 ("OET-69"). This analysis employed the FCC's current "TVStudy" software with the default application processing template settings, 1 km cell size, and 0.1 km terrain increment. Comparisons of various results of this computer program (run on a Mac processor) to the FCC's implementation of TVStudy show excellent correlation.

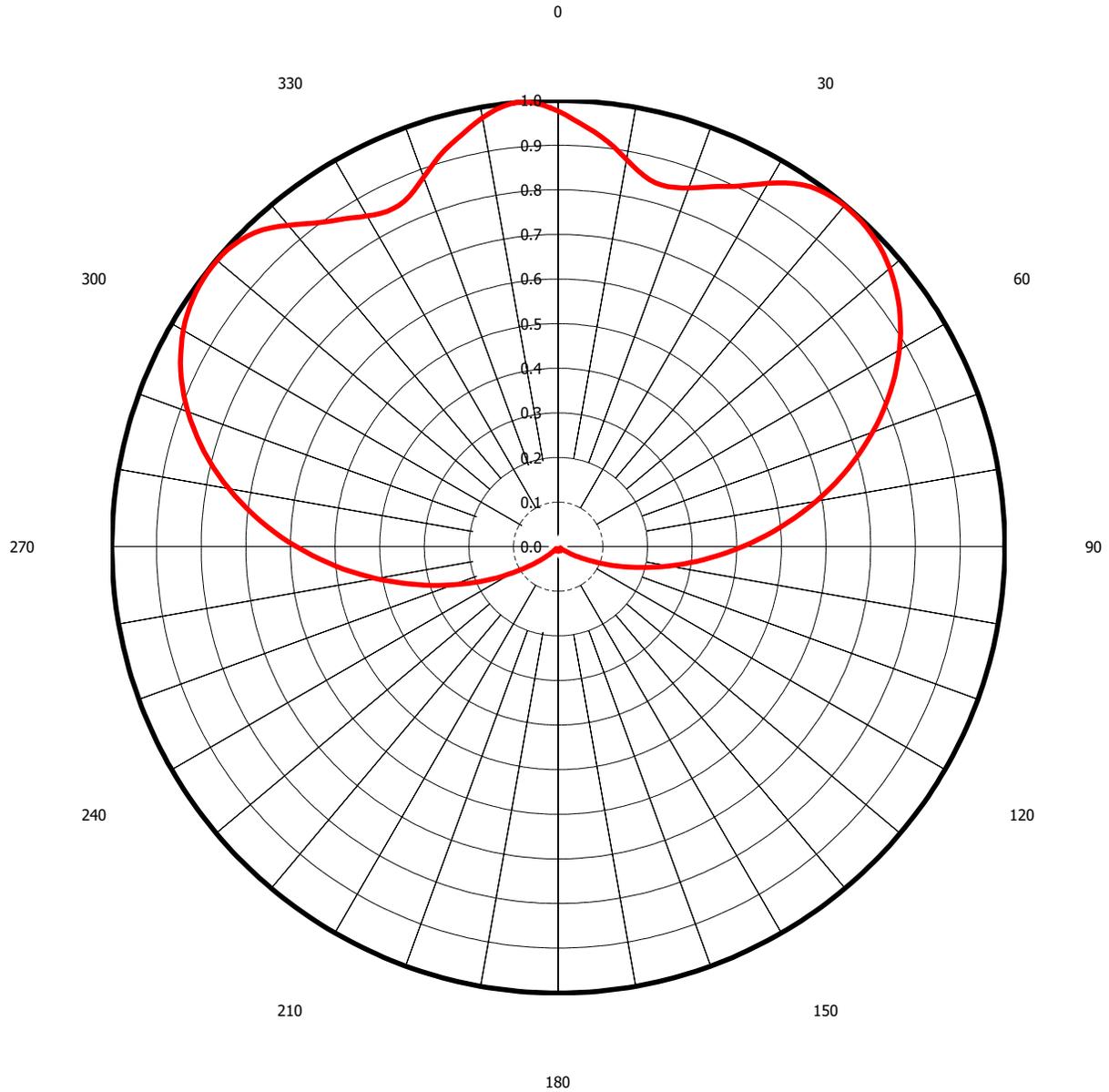
*List of Attachments*

Figure 1      Antenna Azimuthal Pattern  
Figure 2      Coverage Contour Comparison  
Table 1       TVStudy Analysis of Proposal  
Form 2100     Saved Version of Engineering Sections from FCC Form at Time of Upload

**Chesapeake RF Consultants, LLC**

Joseph M. Davis, P.E.      September 30, 2021  
207 Old Dominion Road      Yorktown, VA 23692      703-650-9600

**Azimuth Pattern - Relative Field  
(True North)**



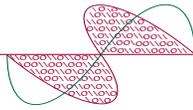
**Figure 1**  
**Antenna Azimuthal Pattern**  
**KPJC-LD San Francisco, CA**  
**Facility ID 182962**  
**Ch. 11 0.059 kW Directional**

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prepared for  
**Jeff Chang**

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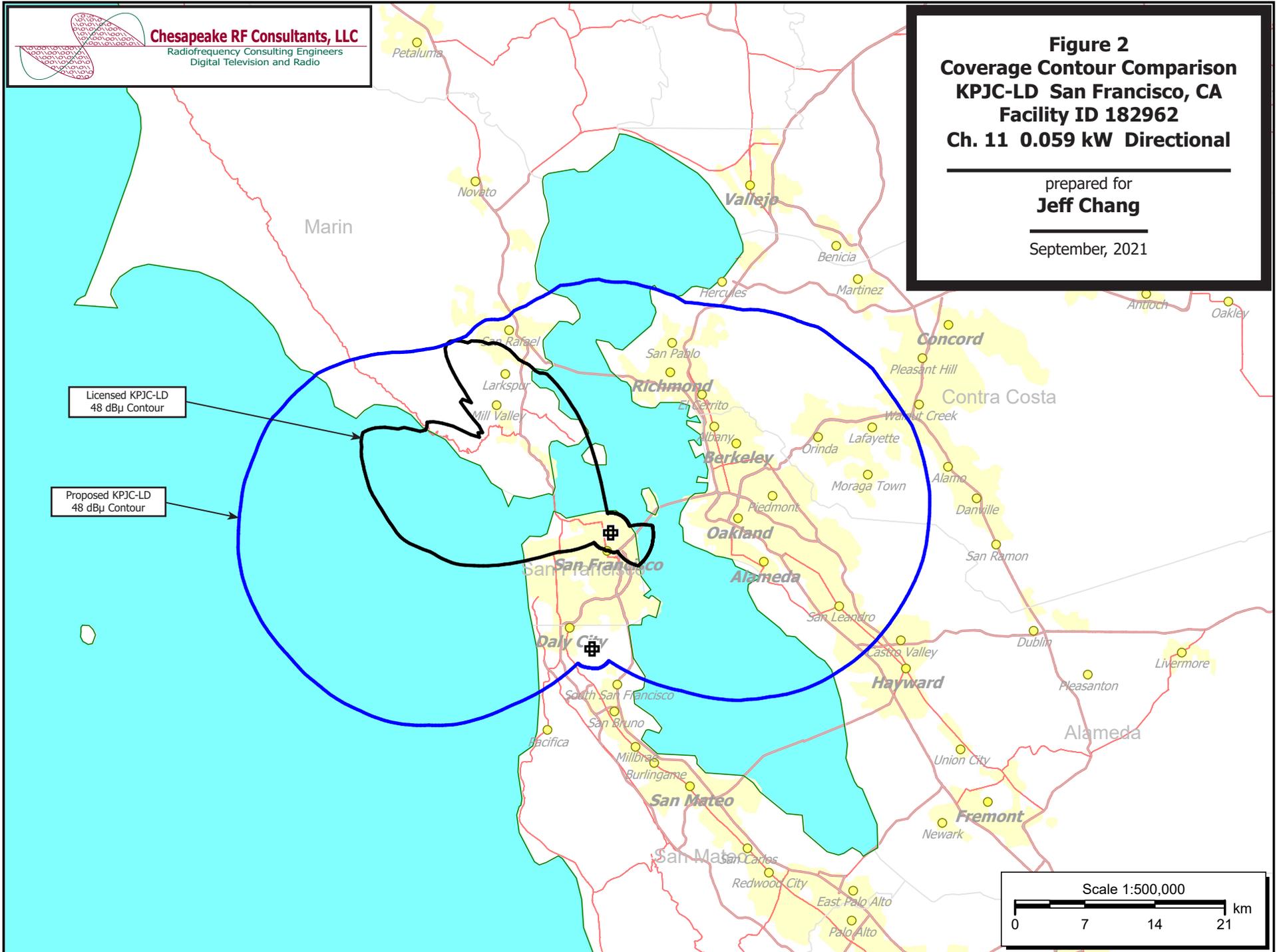
September, 2021



**Chesapeake RF Consultants, LLC**  
Radiofrequency Consulting Engineers  
Digital Television and Radio

**Figure 2**  
**Coverage Contour Comparison**  
**KPJC-LD San Francisco, CA**  
**Facility ID 182962**  
**Ch. 11 0.059 kW Directional**

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**Jeff Chang**  
September, 2021



**Table 1 KPJC-LD TVStudy Analysis of Proposal**  
(page 1 of 3)



tvstudy v2.2.5 (4uoc83)  
Database: localhost, Study: KPJC-LD Bruno\_prop, Model: Longley-Rice  
Start: 2021.09.30 11:27:03

Study created: 2021.09.30 11:27:03

Study build station data: LMS TV 2021-09-30

Proposal: KPJC-LD D11 LD APP San Francisco, CA  
File number: KPJC-LD Bruno\_prop  
Facility ID: 182962  
Station data: User record  
Record ID: 3901  
Country: U.S.

Build options:  
Protect pre-transition records not on baseline channel

Search options:  
Baseline record excluded if station has CP

Stations potentially affected by proposal:

IX	Call	Chan	Svc	Status	City, State	File Number	Distance
Yes	KXTV	D10	DT	LIC	SACRAMENTO, CA	BLANK0000146119	102.3 km
No	K10RU-D	D10	LD	CP	SALINAS, CA	BNPDTL20090825AEI	147.0
No	KKRM-LD	D11	LD	CP	CHICO, CA	BLANK0000074670	260.1
No	KKRM-LD	D11	LD	LIC	CHICO, CA	BLDVL20080728AEJ	260.0
No	KEET	D11	DT	LIC	EUREKA, CA	BLANK0000005864	363.1
No	K27GZ	D11+	LD	LIC	MARIPOSA, CA	BLANK0000121605	208.2
Yes	KGMC	D11	DT	LIC	MERCED, CA	BLANK0000156689	273.8
No	K11XS-D	D11	LD	CP	MODESTO, CA	BNPDTL20090825ALO	118.8
Yes	KCBA	D11	DT	LIC	SALINAS, CA	BLANK0000115967	132.3
Yes	KTVN	D11	DT	LIC	RENO, NV	BLANK0000063879	286.3
No	K49MP-D	D12	LD	APP	LAKEPORT, CA	BLANK0000153740	169.9
No	K12XJ-D	D12-	LD	LIC	MODESTO, CA	BLANK0000114101	124.2
No	KRJR-LP	D12z	LD	CP	SACRAMENTO, CA	BLANK0000051701	135.7
No	K12XN-D	D12	LD	CP	SALINAS, CA	BNPDTL20090825AFN	147.0
No	KGO-TV	D12	DT	LIC	SAN FRANCISCO, CA	BLANK0000113050	7.8

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

Channel: D11  
Mask: Full Service  
Latitude: 37 41 12.30 N (NAD83)  
Longitude: 122 26 7.30 W  
Height AMSL: 420.6 m  
HAAT: 0.0 m  
Peak ERP: 0.059 kW  
Antenna: THA-C2-2H-4H-1-VP C-71784 20210930 355.0 deg  
Elev Pattn: Generic

48.0 dBu contour:

Azimuth	ERP	HAAT	Distance
0.0 deg	0.055 kW	371.2 m	36.8 km
45.0	0.058	412.8	39.6
90.0	0.010	420.5	27.8
135.0	0.000	417.0	2.0
180.0	0.000	235.9	1.9
225.0	0.000	389.4	2.0
270.0	0.020	402.5	31.1
315.0	0.057	401.6	38.8

Database HAAT does not agree with computed HAAT  
Database HAAT: 0 m Computed HAAT: 381 m

Distance to Canadian border: 1174.7 km

Distance to Mexican border: 724.4 km

**Table 1 KPJC-LD TVStudy Analysis of Proposal**  
(page 2 of 3)



Conditions at FCC monitoring station: Livermore CA  
Bearing: 85.7 degrees Distance: 60.0 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:  
Bearing: 74.3 degrees Distance: 1508.1 km

Study cell size: 1.00 km  
Profile point spacing: 0.10 km

Maximum new IX to full-service and Class A: 0.50%  
Maximum new IX to LPTV: 2.00%

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Interference to BLANK0000146119 LIC scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance			
	KXTV	D10	DT	LIC	SACRAMENTO, CA	BLANK0000146119				
Undesireds:	KPJC-LD	D11	LD	APP	San Francisco, CA	KPJC-LD Bruno_prop	102.3 km			
	KVIE	D9	DT	LIC	SACRAMENTO, CA	BLANK0000160094	3.5			
	KERO-TV	D10	DT	LIC	BAKERSFIELD, CA	BLCDT20100929AEF	403.4			
	Service area	Terrain-limited	IX-free, before	IX-free, after	Percent New IX					
	47357.6	10,765,017	42265.6	7,306,154	41999.4	7,292,306	41991.3	7,263,137	0.02	0.40
Undesired			Total IX	Unique IX, before	Unique IX, after					
KPJC-LD	D11	LD	APP	8.1	29,169	8.1	29,169			
KVIE	D9	DT	LIC	10.0	352	10.0	352			
KERO-TV	D10	DT	LIC	256.2	13,496	256.2	13,496			

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Interference to BLANK0000156689 LIC scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance			
	KGMC	D11	DT	LIC	MERCED, CA	BLANK0000156689				
Undesireds:	KPJC-LD	D11	LD	APP	San Francisco, CA	KPJC-LD Bruno_prop	273.8 km			
	KXTV	D10	DT	LIC	SACRAMENTO, CA	BLANK0000146119	223.5			
	KTTV	D11	DT	LIC	LOS ANGELES, CA	BLCDT20100709AFD	340.0			
	KCBA	D11	DT	LIC	SALINAS, CA	BLANK0000115967	187.3			
	KTVN	D11	DT	LIC	RENO, NV	BLANK0000063879	252.3			
	Service area	Terrain-limited	IX-free, before	IX-free, after	Percent New IX					
	41959.2	2,051,210	39477.7	2,000,943	39313.2	1,999,881	39313.2	1,999,881	0.00	0.00
Undesired			Total IX	Unique IX, before	Unique IX, after					
KPJC-LD	D11	LD	APP	1.0	0	0.0	0			
KXTV	D10	DT	LIC	1.0	0	1.0	0			
KTTV	D11	DT	LIC	9.1	216	9.1	216			
KCBA	D11	DT	LIC	146.3	831	142.3	727			
KTVN	D11	DT	LIC	12.1	119	8.1	15			

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Interference to BLANK0000115967 LIC scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance			
	KCBA	D11	DT	LIC	SALINAS, CA	BLANK0000115967				
Undesireds:	KPJC-LD	D11	LD	APP	San Francisco, CA	KPJC-LD Bruno_prop	132.3 km			
	KXTV	D10	DT	LIC	SACRAMENTO, CA	BLANK0000146119	164.9			
	KGMC	D11	DT	LIC	MERCED, CA	BLANK0000156689	187.3			
	KTVN	D11	DT	LIC	RENO, NV	BLANK0000063879	317.8			
	KGO-TV	D12	DT	LIC	SAN FRANCISCO, CA	BLANK0000113050	139.3			
	Service area	Terrain-limited	IX-free, before	IX-free, after	Percent New IX					
	32121.8	3,090,470	25456.5	2,396,089	24512.6	1,343,787	24511.5	1,342,577	0.00	0.09
Undesired			Total IX	Unique IX, before	Unique IX, after					

**Table 1 KPJC-LD TVStudy Analysis of Proposal**  
(page 3 of 3)



KPJC-LD D11 LD APP	63.0	101,391			1.0	1,210
KXTV D10 DT LIC	2.0	0	0.0	0	0.0	0
KGMC D11 DT LIC	393.0	110,082	308.7	6,845	308.7	6,845
KTVN D11 DT LIC	8.1	122	2.0	0	2.0	0
KGO-TV D12 DT LIC	629.2	1,045,335	548.9	942,220	492.1	842,039

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Interference to BLANK000063879 LIC scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	KTVN	D11	DT	LIC	RENO, NV	BLANK000063879	
Undesireds:	KPJC-LD	D11	LD	APP	San Francisco, CA	KPJC-LD Bruno_prop	286.3 km
	KXTV	D10	DT	LIC	SACRAMENTO, CA	BLANK0000146119	184.2
	KGMC	D11	DT	LIC	MERCED, CA	BLANK0000156689	252.3
	KCBA	D11	DT	LIC	SALINAS, CA	BLANK0000115967	317.8
	Service area	Terrain-limited	IX-free, before	IX-free, after	Percent New IX		
	50085.9	998,326	43512.9	912,410	43442.8	907,921	43440.8
							907,921
							0.00
							0.00
Undesired			Total IX	Unique IX, before	Unique IX, after		
KPJC-LD D11 LD APP		7.0	1,130		2.0	0	
KXTV D10 DT LIC		37.0	4,420	24.0	2,646	23.0	2,252
KGMC D11 DT LIC		13.0	308	3.0	69	3.0	69
KCBA D11 DT LIC		37.1	1,535	26.1	0	25.1	0

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Interference to proposal scenario 1  
50.64% interference received

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	KPJC-LD	D11	LD	APP	San Francisco, CA	KPJC-LD Bruno_prop	
Undesireds:	KKRM-LD	D11	LD	CP	CHICO, CA	BLANK0000074670	260.1 km
	KCBA	D11	DT	LIC	SALINAS, CA	BLANK0000115967	132.3
	KGO-TV	D12	DT	LIC	SAN FRANCISCO, CA	BLANK0000113050	7.8
	Service area	Terrain-limited	IX-free	Percent IX			
	2347.4	2,044,964	2212.9	1,956,025	920.1	965,475	58.42
							50.64
Undesired			Total IX	Unique IX	Prcnt Unique IX		
KCBA D11 DT LIC		30.4	34,791	1.0	0	0.05	0.00
KGO-TV D12 DT LIC		1291.8	990,550	1262.4	955,759	57.05	48.86

**Channel and  
Facility  
Information**

Section	Question	Response
Facility ID	182962	
State	California	
City	San Francisco	
LPD Channel	11	

**Primary station proposed to be rebroadcast:**

Facility Id	Call Sign	City	State
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**Antenna Location  
Data**

Section	Question	Response
<b>Antenna Structure Registration</b>	Do you have an FCC Antenna Structure Registration (ASR) Number?	Yes
	ASR Number	1010566
<b>Coordinates (NAD83)</b>	Latitude	37° 41' 12.3" N+
	Longitude	122° 26' 07.3" W-
	Structure Type	LTOWER-Lattice Tower
	Overall Structure Height	78.3 meters
	Support Structure Height	61.3 meters
	Ground Elevation (AMSL)	390.1 meters
<b>Antenna Data</b>	Height of Radiation Center Above Ground Level	30.5 meters
	Height of Radiation Center Above Mean Sea Level	420.6 meters
	Effective Radiated Power	0.059 kW

**Antenna  
Technical Data**

Section	Question	Response
<b>Antenna Type</b>	Antenna Type	Directional Custom
	Do you have an Antenna ID?	No
	Antenna ID	
<b>Antenna Manufacturer and Model</b>	Manufacturer:	Dielectric
	Model	THA-C2-2H/4H-1-VP
	Rotation	355 degrees
	Electrical Beam Tilt	Not Applicable
	Mechanical Beam Tilt	Not Applicable
	toward azimuth	
	Polarization	Elliptical
<b>Elevation Radiation Pattern</b>	Does the proposed antenna propose elevation radiation patterns that vary with azimuth for reasons other than the use of mechanical beam tilt?	No
	Uploaded file for elevation antenna (or radiation) pattern data	
	Out-of-Channel Emission Mask:	Full Service

**Directional Antenna Relative Field Values (Pre-rotated Pattern)**

Degree	Value	Degree	Value	Degree	Value	Degree	Value
0	1.000	90	0.500	180	0.010	270	0.500
10	0.933	100	0.329	190	0.010	280	0.671
20	0.844	110	0.179	200	0.010	290	0.821
30	0.891	120	0.067	210	0.010	300	0.933
40	0.985	130	0.010	220	0.010	310	0.992
50	0.992	140	0.010	230	0.010	320	0.985
60	0.933	150	0.010	240	0.067	330	0.891
70	0.821	160	0.010	250	0.179	340	0.844
80	0.671	170	0.010	260	0.329	350	0.933

**Additional Azimuths**

Degree	V <sub>A</sub>
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