ENGINEERING EXHIBIT

Displacement Application for Modification of Digital Television Translator Station

prepared for

Oregon TV License Company LLC
K46CH-D Gold Hill, OR
Facility ID 60739
Ch. 15 (digital) 1.65 kW

Oregon TV License Company LLC ("Oregon TV") is the licensee of digital television translator station K46CH-D, Channel 46, Gold Hill, OR, Facility ID 60739. K46CH-D has received a 120 day notice from a 600 MHz licensee that the wireless licensee intends to commence operations and K46CH-D is predicted to cause interference to the wireless operations. Pursuant to the procedures described in DA 17-584,[1] *Oregon TV* herein seeks a displacement channel for K46CH-D.

The 120 day notice, attached separately, states that wireless operations will commence on October 31, 2017, in advance of the Special Displacement Window. Therefore, *Oregon TV* requests a waiver of the Displacement Freeze.[2] A request for Special Temporary Authority is being submitted contemporaneously to operate on the proposed displacement channel pending the final outcome of the Special Displacement Window.

As proposed herein, K46CH-D will operate at its existing antenna location and height on Channel 15 in lieu of the licensed Channel 46. The existing antenna supporting structure is not registered as the overall structure height is less than 61 meters above ground and passes the FCC's TOWAIR program for the tower location. The proposed K46CH-D facility will employ a replacement antenna system and no change to the overall structure height is proposed.

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[1] *"Incentive Auction Task Force and Media Bureau Set Forth Tools Available to LPTV/Translator Stations Displaced Prior to the Special Displacement Window,"* Public Notice, DA 17-584, released June 13, 2017.

[2] *"Freeze on the Filing of Applications for Digital Replacement Translator Stations and Displacement Applications,"* Public Notice, DA 14-808, released June 11, 2014.

The existing K46CH-D facility is licensed to operate at 1.5 kW effective radiated power ("ERP") with a directional antenna. As proposed herein, the Channel 15 K46CH-D facility will operate at 1.65 kW ERP with a similar directional antenna pattern and 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 51 dBµ coverage contour of the licensed and proposed facilities, demonstrating compliance with §73.3572 for a minor change.

Interference study per OET Bulletin 69[3] shows that the proposal complies with the FCC's interference protection requirements toward all digital television, television translator, LPTV, and Class A stations (existing and post-auction). 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.

The nearest FCC monitoring station is 533 km distant at Livermore, CA. This exceeds by a large margin the threshold minimum distance specified in §73.1030(c)(3) that would suggest consideration of the monitoring station. The site is not located within the areas requiring coordination with "quiet" zones specified in §73.1030(a) and (b). There are no AM broadcast stations within 3 km of the site. The site location is beyond the border areas requiring international coordination.

Human Exposure to Radiofrequency Electromagnetic Field (Environmental)

The proposed K46CH-D operation was evaluated for human exposure to Radiofrequency ("RF") energy using the procedures outlined in the FCC's OET Bulletin Number 65. Based on OET-65 equation (10), and considering the antenna relative field in downward elevations, the graph in Figure 3 depicts calculated power density levels attributable to the proposed K46CH-D at locations near the site at a height of two meters above ground level. The maximum calculated RF electromagnetic field attributable to the proposed K46CH-D facility is 18.1 percent of the

[3]FCC Office of Engineering and Technology Bulletin number 69, *Longley-Rice Methodology for Evaluating 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 1 km terrain increment. Comparisons of various results of this computer program (run on a Mac processor) to the FCCs implementation of TVStudy show excellent correlation.

general population / uncontrolled MPE limit at any location two meters above ground level, which occurs within 40 meters of the K46CH-D tower location. Along azimuths where the proposed directional antenna is at maximum radiation, the actual terrain drops sharply, thus reducing the signal density at ground level locations from the values depicted on Figure 3.

Several other television translator and FM radio facilities are authorized at this site (some on a separate tower structure, immediately adjacent). The following table supplies a summary of RF signal density calculations for the proposed K46CH-D and the other facilities at this site. No other authorized broadcast facilities are near enough to the site to contribute significant RF levels.

Summary of Radiofrequency Electromagnetic Field Calculations

Facility	Channel	ERP (kW)	Polari-zation	Relative Field	Height (meters)	S - Calculated ($\mu W/cm^2$)	S - Limit ($\mu W/cm^2$)	Percent of Limit
K46CH-D Gold Hill, OR Proposed Herein	15	1.65	H	See Graph	8	57.7	319.3	18.1%
K02FT Gold Hill, OR Lic BLTTV-4699 (analog)	2	0.045	H	0.3	10 (est)	1.1	200.0	0.5%
K04JZ Gold Hill, OR Lic LMS-0000016525	4	0.012	H	0.3	4	9.0	200.0	4.5%
K27KW-D Gold Hill, OR Lic BLDTT-20111103AKP	27	0.1	H	0.2	25	0.25	367.3	0.1%
K50FW-D Grants Pass, OR Lic LMS-0000002221	50	0.662	H	0.2	22	2.2	459.3	0.5%
KAKT(FM) Phoenix, OR Lic BLH-19901001KD	286	52	C	Note 1	43	105.3	200.0	52.7%
K296BS Medford OR Lic BLFT-20150720ABM	296	0.18	V	Note 2	27	9.2	200.0	4.6%
						Total Calculated Signal Density:		**81.0%**

ERP: Effective Radiated Power
Polarization: H - Horizontal; V – Vertical; C - Circular
Field: Elevation Pattern Relative Field Value, assumed values
Height: Height of radiation center above ground level
S-Calc: OET Bulletin 65 calculated value of signal density at two meters above ground level
S-Limit: §1.1310 uncontrolled/general population limit for signal density
Note 1: KAKT determination from graph in renewal application BRH-20050930AYE
Note 2: K296BS determination via FCC "FMModel" tool and one Type 1 radiator element

Based on this analysis and considering all broadcast facilities, the total maximum calculated RF density at two meters above ground level near the proposed site will be 81.0 percent of the FCC's uncontrolled / general population maximum permissible exposure

limit. No other television broadcast, radio broadcast, or other nonexcluded facilities are known to be within sufficient distance to be a significant contributor to RF exposure at this location.

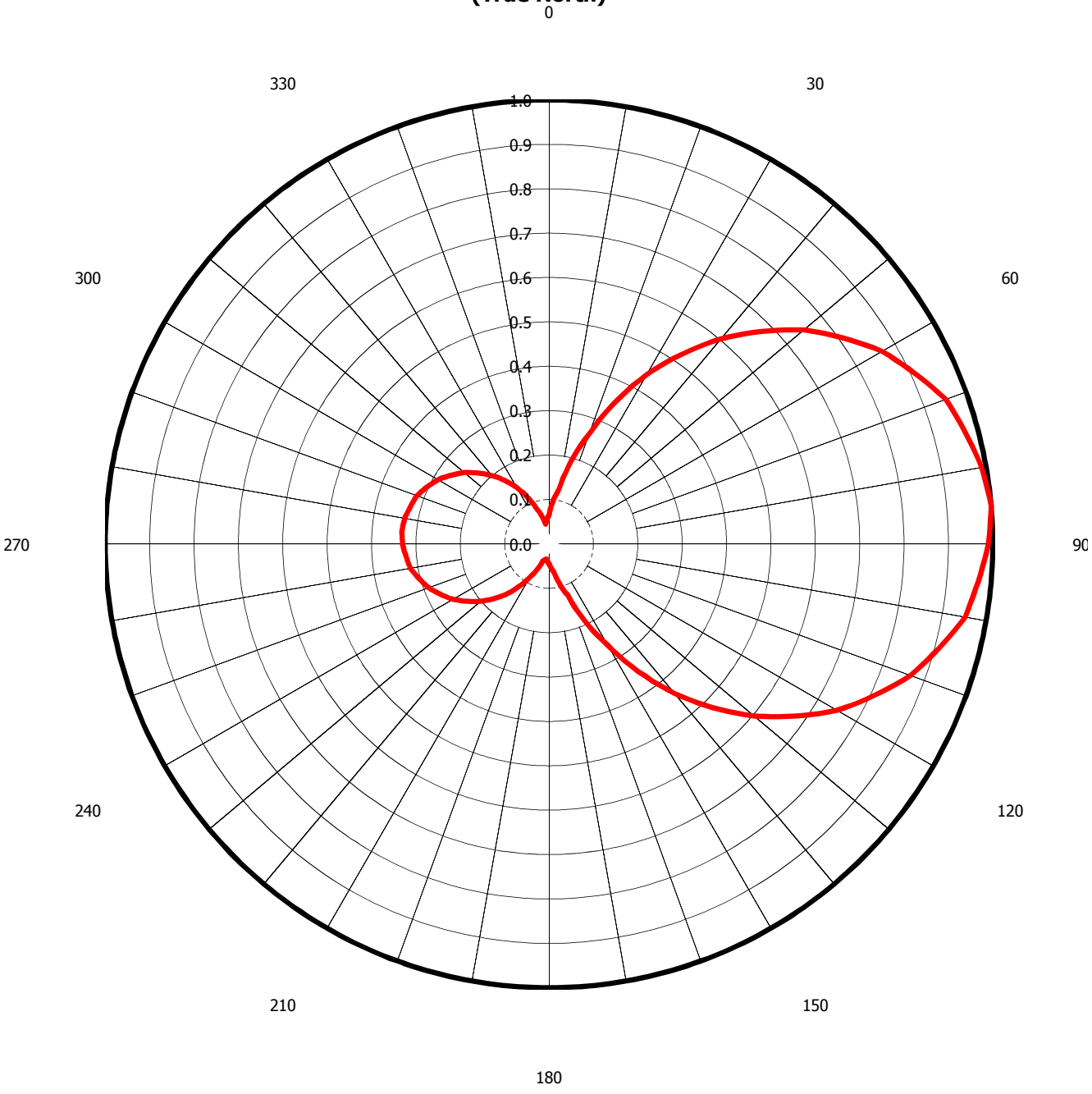
The general public will not be exposed to RF levels attributable to the proposal in excess of the FCC's guidelines. RF exposure warning signs will continue to be posted. With respect to worker safety, the applicant will coordinate exposure procedures with all pertinent stations and will reduce power or cease operation as necessary to protect persons having access to the site, tower, or antenna from RF electromagnetic field exposure in excess of FCC guidelines. This exhibit is limited to the evaluation of exposure to RF electromagnetic field. No increase in structure height is proposed.

List of Attachments

Figure 1	Antenna Azimuthal Pattern
Figure 2	Coverage Contour Comparison
Figure 3	Calculated RF Electromagnetic Field
Table 1	OET Bulletin 69 Interference Study
Form 2100	Saved Version of Engineering Sections from FCC Form at Time of Upload

Chesapeake RF Consultants, LLC
Joseph M. Davis, P.E. September 14, 2017
207 Old Dominion Road Yorktown, VA 23692 703-650-9600

Azimuth Pattern - Relative Field
(True North)



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

Figure 1
Antenna Azimuthal Pattern
K46CH-D Gold Hill, OR
Facility ID 60739
Ch. 15 (digital) 1.65 kW

prepared for
Oregon TV License Company LLC

September, 2017

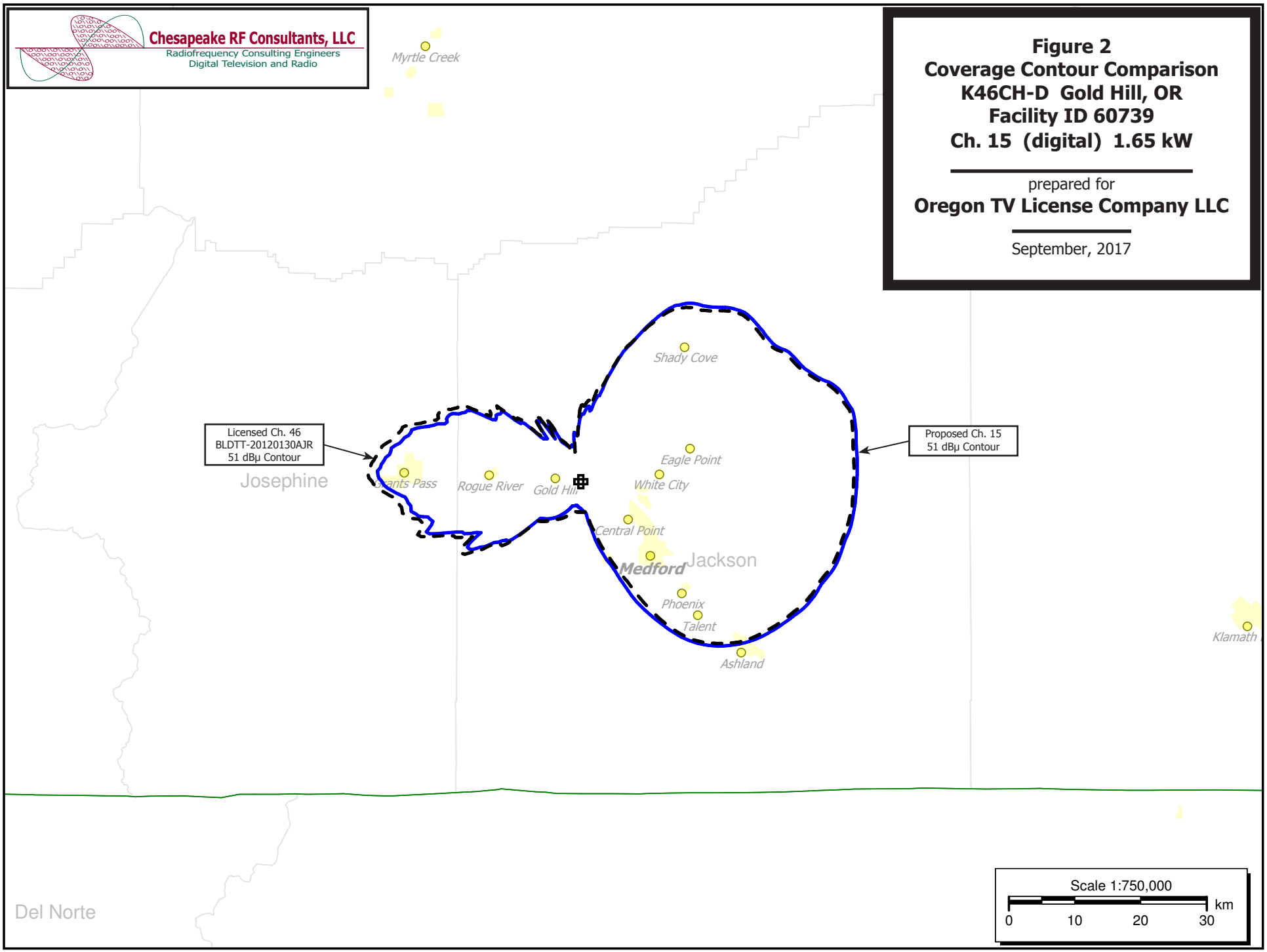

Chesapeake RF Consultants, LLC
Radiofrequency Consulting Engineers
Digital Television and Radio
Figure 2
Coverage Contour Comparison
K46CH-D Gold Hill, OR
Facility ID 60739
Ch. 15 (digital) 1.65 kW
prepared for
Oregon TV License Company LLC
September, 2017
Licensed Ch. 46
BLDTT-20120130AJR
51 dBµ Contour
Proposed Ch. 15
51 dBµ Contour
Myrtle Creek
Shady Cove
Eagle Point
White City
Josephine
Grants Pass
Rogue River
Gold Hill
Central Point
Jackson
Medford
Phoenix
Talent
Ashland
Klamath
Del Norte
Scale 1:750,000
km
0
10
20
30

Table 1 K46CH-D OET Bulletin 69 Interference Study


```
tvstudy v2.2.3 (6K70F1)
Database: localhost,  Study: K46CH-D Ch-15 1.65kW_Prop,  Model: Longley-Rice
Start: 2017.09.14 15:22:06

Study created: 2017.09.14 15:21:28

Study build station data: LMS TV 2017-09-13 LMSTV

    Proposal: K46CH-D D15 LD APP GOLD HILL, OR
 File number: K46CH-D Ch-15 1.65kW_Prop
 Facility ID: 60739
Station data: User record
   Record ID: 219
     Country: U.S.
        Zone: II

Build options:
Protect records not on baseline channel
Protect baseline records from LPTV

Stations potentially affected by proposal:
```

IX	Call	Chan	Svc	Status	City, State	File Number	Distance
No	K10FS	D14	LD	CP	Eureka, ca, CA	BLANK0000029328	204.6 km
No	K14QH-D	D14	LD	LIC	BUTTE FALLS, OR	BLANK0000016527	38.8
No	K14MQ-D	D14	LD	LIC	COOS BAY, OR	BLDTL20101122ADP	141.2
No	K14LP-D	D14	LD	LIC	COTTAGE GROVE, OR	BLDTT20090706AGJ	150.1
No	K04JP	D14	LD	CP	WILLIAMS, OR	BDCCDTT20141002AAL	37.9
No	K15HV-D	D15	LD	LIC	CHICO, CA	BLDTL20080805AAT	294.9
No	KBIT-LD	D15	LD	APP	CHICO, CA	BLANK0000029360	371.7
No	K15CX	D15	LD	CP	OROVILLE, CA	BDFCDTT20110613ACB	350.5
No	K15CX	N15z	TX	LIC	OROVILLE, CA	BLTTL20020613AAH	350.5
No	K15IC-D	D15	LD	LIC	WEED, CA	BLDTL20140221ACR	121.1
No	KNPB	D15	DT	LIC	RENO, NV	BLEDT20031023AAU	414.8
Yes	K15JZ-D	D15	LD	LIC	APPLEGATE VALLEY, OR	BLANK0000024546	23.4
No	KFXO-CD	D15	DC	CP	BEND, OR	BLANK0000024535	227.9
No	KFXO-CD	D15	DC	BL	BEND, OR	DTVBL35464	227.9
No	K15IM-D	D15	LD	LIC	BROOKINGS, ETC, OR	BLDTT20111103AKT	112.0
No	K15KF-D	D15	LD	LIC	COOS BAY, OR	BLANK0000005167	141.5
No	KORY-CD	D15	DC	LIC	EUGENE, OR	BLDTA20120222AAU	175.3
No	K15JI-D	D15	LD	CP	EUGENE, OR	BNPDTL20100716ADB	175.3
Yes	K15BP-D	D15	LD	LIC	GRANTS PASS, OR	BLDTT20090615AFL	24.4
No	K15KE-D	D15	LD	LIC	KLAMATH FALLS, ETC, OR	BLANK0000011186	103.6
No	K15HU-D	D15	LD	LIC	LAKEVIEW, OR	BLDTT20091118ACG	195.0
No	K15DS-D	D15	LD	LIC	NEWPORT, ETC., OR	BLDTL20130130AIS	272.2
No	KOXO-CD	D15	DC	CP	PORTLAND, OR	BLANK0000027193	344.6
No	KOXO-CD	D15	DC	BL	PORTLAND, OR	DTVBL71080	344.6
No	K51GJ-D	D15	LD	APP	ROSEBURG, OR	BLANK0000029043	91.5
No	K15JG-D	D15	LD	LIC	SCOTTSBURG, OR	BLDTT20120511ABH	151.1
No	K15KB-D	D15	LD	LIC	SQUAW VALLEY, OR	BLANK0000011191	111.9
No	K16JJ-D	D16	LD	CP	EUREKA, CA	BLANK0000010786	204.6
No	K16IW-D	D16	LD	CP	REDDING, CA	BLANK0000010674	201.2
No	K16IE-D	D16	LD	LIC	COOS BAY, OR	BLDTT20101216ABJ	140.6
No	K40IS-D	D16	LD	APP	COTTAGE GROVE, OR	BLANK0000029342	150.1
No	K16IG-D	D16	LD	LIC	COTTAGE GROVE, OR	BLDTL20140221ACI	143.6
No	K16IF-D	D16	LD	CP	GRANTS PASS, OR	BNPDTL20090825BGI	36.0
No	K47KH-D	D16	LD	APP	PORT ORFORD, OR	BLANK0000029137	127.8
No	KPIC	D16	LD	LIC	ROSEBURG, OR	BLCDT20131205AIL	91.4

```
No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

    Channel: D15
       Mask: Full Service
   Latitude:  42 25 40.00 N (NAD83)
  Longitude: 123  0  8.10 W
Height AMSL: 653.0 m
       HAAT: 0.0 m
   Peak ERP: 1.65 kW
    Antenna: SCA 4DR-4S 1x2 Ch-15 K46CH-D 0.0 deg
Elev Pattrn: Generic

48.8 dBu contour:
Azimuth      ERP       HAAT   Distance
  0.0 deg  0.007 kW   126.8 m   11.2 km
 45.0      0.755      223.8     38.2
 90.0       1.62      264.3     44.3
135.0      0.449      255.4     37.1
180.0      0.003      -75.9      4.6
225.0      0.050       -0.9      9.0
270.0      0.180      270.0     32.9
```

315.0 0.084 60.7 14.5

Database HAAT does not agree with computed HAAT
Database HAAT: 0 m Computed HAAT: 141 m

Distance to Canadian border: 645.7 km

Distance to Mexican border: 1196.9 km

Conditions at FCC monitoring station: Livermore CA
Bearing: 168.1 degrees Distance: 533.4 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:
Bearing: 93.7 degrees Distance: 1500.8 km

No land mobile station failures found

Proposal is not within the Offshore Radio Service protected area

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

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

Interference to BLANK0000024546 LIC, scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	K15JZ-D	D15	LD	LIC	APPLEGATE VALLEY, OR	BLANK0000024546	
Undesireds:	K46CH-D	D15	LD	APP	GOLD HILL, OR	K46CH-D Ch-15 1.65kW_P	23.4 km
	K15BP-D	D15	LD	LIC	GRANTS PASS, OR	BLDTT20090615AFL	33.7

Service area		Terrain-limited		IX-free, before		IX-free, after		Percent New IX	
533.2	4,599	482.2	4,145	469.2	3,937	468.2	3,937	0.21	0.00

Undesired	Total IX	Unique IX, before		Unique IX, after	
K46CH-D D15 LD APP	3.0	0		1.0	0
K15BP-D D15 LD LIC	13.0	208	13.0	208	11.0	208

Interference to BLDTT20090615AFL LIC, scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	K15BP-D	D15	LD	LIC	GRANTS PASS, OR	BLDTT20090615AFL	
Undesireds:	K46CH-D	D15	LD	APP	GOLD HILL, OR	K46CH-D Ch-15 1.65kW_P	24.4 km
	K15JZ-D	D15	LD	LIC	APPLEGATE VALLEY, OR	BLANK0000024546	33.7
	K51GJ-D	D15	LD	APP	ROSEBURG, OR	BLANK0000029043	83.7
	K16IF-D	D16	LD	CP	GRANTS PASS, OR	BNPDTL20090825BGI	17.3

Service area		Terrain-limited		IX-free, before		IX-free, after		Percent New IX	
2667.5	78,924	2028.4	71,317	2011.2	71,247	1988.9	71,181	1.11	0.09

Undesired	Total IX	Unique IX, before		Unique IX, after	
K46CH-D D15 LD APP	22.3	66		22.3	66
K15JZ-D D15 LD LIC	4.0	5	4.0	5	4.0	5
K51GJ-D D15 LD APP	2.0	0	0.0	0	0.0	0
K16IF-D D16 LD CP	13.1	65	11.1	65	11.1	65

Interference to proposal, scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	K46CH-D	D15	LD	APP	GOLD HILL, OR	K46CH-D Ch-15 1.65kW_P	
Undesireds:	K14QH-D	D14	LD	LIC	BUTTE FALLS, OR	BLANK0000016527	38.8 km
	K15BP-D	D15	LD	LIC	GRANTS PASS, OR	BLDTT20090615AFL	24.4

Service area		Terrain-limited		IX-free		Percent IX	
2420.6	224,869	1906.4	179,790	1889.3	178,524	0.90	0.70

Undesired	Total IX		Unique IX		Prcnt Unique IX	
K14QH-D D14 LD LIC	1.0	0	1.0	0	0.05	0.00
K15BP-D D15 LD LIC	16.1	1,266	16.1	1,266	0.85	0.70

Channel and Facility Information

Section	Question	Response
Proposed Community of License	Facility ID	60739
	State	Oregon
	City	GOLD HILL
	LPT Channel	15

Antenna Location Data

Section	Question	Response
Antenna Structure Registration	Do you have an FCC Antenna Structure Registration (ASR) Number?	No
	ASR Number	
Coordinates (NAD83)	Latitude	42° 25' 40.0" N+
	Longitude	123° 00' 08.1" W-
	Structure Type	TOWER-A free standing or guyed struct
	Overall Structure Height	12 meters
	Support Structure Height	12 meters
	Ground Elevation (AMSL)	645 meters
Antenna Data	Height of Radiation Center Above Ground Level	8 meters
	Height of Radiation Center Above Mean Sea Level	653 meters
	Effective Radiated Power	1.65 kW

Antenna Technical Data

Section	Question	Response
Antenna Type	Antenna Type	Directional Custom
	Do you have an Antenna ID?	No
	Antenna ID	
Antenna Manufacturer and Model	Manufacturer:	SCA
	Model	4DR-4S 1x2 Array
	Rotation	0 degrees
	Electrical Beam Tilt	Not Applicable
	Mechanical Beam Tilt	Not Applicable
	toward azimuth	
	Polarization	Horizontal
Elevation Radiation Pattern	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	V_A (Authorized Value)	Degree	V_A (Authorized Value)	Degree	V_A (Authorized Value)	Degree	V_A (Authorized Value)
0	0.065	**90**	0.990	**180**	0.045	**270**	0.330
10	0.123	**100**	0.952	**190**	0.035	**280**	0.330
20	0.262	**110**	0.867	**200**	0.041	**290**	0.317
30	0.440	**120**	0.750	**210**	0.087	**300**	0.289
40	0.603	**130**	0.603	**220**	0.147	**310**	0.250
50	0.750	**140**	0.440	**230**	0.201	**320**	0.201
60	0.867	**150**	0.262	**240**	0.250	**330**	0.147
70	0.952	**160**	0.123	**250**	0.289	**340**	0.087
80	0.990	**170**	0.065	**260**	0.317	**350**	0.045

Additional Azimuths

Degree	V_A
85	1.000
275	0.333