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Engineering Statement
Digital Replacement Translator Application for KOAB-TV
Channel 30 at Warm Springs, Oregon
December 2010

This Engineering Statement has been prepared on behalf of Oregon Public Broadcasting, licensee of non-commercial television station KOAB-TV at Bend, Oregon. This material has been prepared in connection with an application for a digital replacement translator to ensure that KOAB-TV digital service is provided to viewers in the vicinity of Warm Springs, Oregon.

The proposed facility will be installed on a tower owned by and located on land owned by the Warm Springs Indian Reservation, a Federally-recognized Indian tribe.

I. Allocation Study

Study has been made of all cochannel and adjacent-channel facilities in the vicinity of the proposed operation, including a detailed Longley-Rice interference study to demonstrate that the proposed operation will not cause interference to any facilities with which contour overlap exists. This study was performed using the SunDTV program from V-Soft Communications and a 1 km grid spacing. The SunDTV program identically duplicates the FCC's OET-69 processing program.

The attached interference analysis was performed assuming omndirectional operation with 300 watts ERP. The actual proposed operation will be directional with 300 watts ERP, so this study can be considered to be worst-case. The results of this study indicate that the proposed facility is predicted to cause zero additional interference to any of the listed stations.

Based on the foregoing allocation and interference study, it is believed that the proposed facility can operate without risk of interference to other stations.

Summary Study

Percent allowed new interference: 0.500
Percent allowed new interference to non Class A LPTV: 2.000
Census data selected 2000
Data Base Selected
./data_files/pt_tvdb.sff
TV INTERFERENCE and SPACING ANALYSIS PROGRAM

Date: 11-29-2010 Time: 16:24:08

Record Selected for Analysis

WARM USERRECORD-01 WARM SPRINGS OR US
Channel 30 ERP 0.3 kW HAAT 61. m RCAMSL 00696 m SIMPLE MASK
Latitude 044-46-16 Longitude 0121-15-42
Status APP Zone 2 Border Site number: 01
Dir Antenna Make usr Model USRPAT01 Beam tilt N Ref Azimuth 0.
Last update Cutoff date Docket
Comments
Applicant

Cell Size for Service Analysis 1.0 km/side

Distance Increments for Longley-Rice Analysis 1.00 km

Not full service station
Service Class = LD
Maximum height/power limits not checked

Site number 1

Azimuth (Deg)	ERP (kW)	HAAT (m)	51.0 dBu F(50,90) (km)
0.0	0.300	33.0	12.8
45.0	0.300	154.5	27.0
90.0	0.300	68.2	18.7
135.0	0.300	33.0	12.8
180.0	0.300	109.5	23.6
225.0	0.300	33.0	12.8
270.0	0.300	33.0	12.8
315.0	0.300	33.0	12.8

Contour Overlap to Proposed Station

Contour Overlap Evaluation to Proposed Station Complete

SPACING VIOLATION FOUND BETWEEN STATION

WARM 30 WARM SPRINGS OR USERRECORD01 Site # 01

and station

SHORT TO: KABH-CA 15 BEND OR BLTTA 20030131AJE
044-04-30 0121-19-46
Req. separation => 24.1 <= 96.6 Actual separation 77.5 Short 19.1(53.4) km

SHORT TO: K52CH 15 MAUPIN OR BDISDTT 20090824AAB
045-11-12 0121-03- 9

Req. separation => 24.1 <= 96.6 Actual separation 49.1 Short 47.5(25.0) km

SHORT TO: NEW   16 BEND   OR BNPDTL   20100716ACW
044-04-30 0121-19-46
Req. separation => 24.1 <= 96.6 Actual separation 77.5 Short 19.1(53.4) km

SHORT TO: K16EM-D 16 PRINEVILLE, ETC.   OR BLDTT   20091124AHA
044-26- 7 0120-57- 8
Req. separation => 24.1 <= 96.6 Actual separation 44.7 Short 51.9(20.6) km

SHORT TO: K22IL-D 22 PRINEVILLE, ETC.   OR BLDTT   20091202ACB
044-26-13 0120-57-11
Req. separation => 24.1 <= 96.6 Actual separation 44.5 Short 52.1(20.4) km

SHORT TO: K23CU-D 23 PRINEVILLE   OR BLDTL   20091014AAG
044-26-15 0120-57-11
Req. separation => 24.1 <= 96.6 Actual separation 44.4 Short 52.2(20.3) km

SHORT TO: K26JG-D 26 MADRAS & CULVER   OR BDCCDTT   20081205AFJ
044-26-17 0120-57-14
Req. separation => 24.1 <= 96.6 Actual separation 44.3 Short 52.3(20.2) km

SHORT TO: K58BU   26 MAUPIN   OR BDISDTT   20090824AAE
045-11-12 0121-03- 9
Req. separation => 24.1 <= 96.6 Actual separation 49.1 Short 47.5(25.0) km

SHORT TO: K27DO   27 BEND, ETC.   OR BDFCDTA   20060703ACY
044-26-17 0120-57-13
Req. separation => 24.1 <= 96.6 Actual separation 44.4 Short 52.2(20.3) km

SHORT TO: K27DO   27 BEND, ETC.   OR BLTTL   19960507JL
044-26-17 0120-57-13
Req. separation => 24.1 <= 96.6 Actual separation 44.4 Short 52.2(20.3) km

SHORT TO: K49KT-D 28 BEND   OR BPTTL   20090511AZL
044-04-43 0121-33- 7
Req. separation => 24.1 <= 96.6 Actual separation 80.3 Short 16.3(56.2) km

SHORT TO: K60CH   28 MAUPIN   OR BDISDTT   20090824AAF
045-11-12 0121-03- 9
Req. separation => 24.1 <= 96.6 Actual separation 49.1 Short 47.5(25.0) km

SHORT TO: K29CI   29 PRINEVILLE, ETC.   OR BLTT   19911031SK
044-11-51 0120-58-35
Req. separation => 12.0 <= 106.0 Actual separation 67.7 Short 38.3(55.7) km

SHORT TO: DK67AD   29 THE DALLES   OR BDISTT   20071121ACT
045-42-43 0121-06-58
Req. separation => 12.0 <= 106.0 Actual separation 105.2 Short   0.8(93.2) km

SHORT TO: NEW   30 EUGENE   OR BNPDTL   20100728ADJ
044-03-30 0123-04- 8
Req. separation 244.6 Actual separation 164.3 Short 80.3 km

SHORT TO: K30JT-D 30 LA PINE   OR BLDTT   20100106ABC
043-39- 1 0121-25-44
Req. separation 244.6 Actual separation 125.3 Short 119.3 km

SHORT TO: K30EW   30 MONUMENT, ETC.   OR BLTTL   19950818JD
045-12-47 0119-17-41
Req. separation 244.6 Actual separation 162.7 Short 81.9 km

SHORT TO: K30EW   30 MONUMENT, ETC.   OR BDFCDTL   20090824ACH
045-12-47 0119-17-41
Req. separation 244.6 Actual separation 162.7 Short 81.9 km

SHORT TO: K30EW   30 MONUMENT, ETC.   OR BDFCDTL   20060331BDB
045-12-47 0119-17-41
Req. separation 244.6 Actual separation 162.7 Short 81.9 km

SHORT TO: NEW   30 ROSEBURG   OR BNPDTL   20090825BHI
043-12-10 0123-22-44
Req. separation 244.6 Actual separation 243.3 Short   1.3 km

SHORT TO: KPDX   30 VANCOUVER   WA BMPCDT   20080619AGD
045-31-19 0122-44-53
Req. separation 223.7 Actual separation 143.6 Short 80.1 km

SHORT TO: KUNW-LD 30 YAKIMA   WA BLDTL   20090923ACQ
046-31-58 0120-30-33
Req. separation 244.6 Actual separation 204.4 Short 40.2 km

SHORT TO: K31CR-D 31 PRINEVILLE, ETC.   OR BLDTT   20081016AEI
044-11-51 0120-58-35
Req. separation => 12.0 <= 106.0 Actual separation 67.7 Short 38.3(55.7) km

SHORT TO: K31HZ-D 31 THE DALLES, ETC.   OR BLDTT   20091125AAT
045-42-43 0121-06-58
Req. separation => 12.0 <= 106.0 Actual separation 105.2 Short   0.8(93.2) km

SHORT TO: K62EI   32 MAUPIN   OR BDISDTT   20090824AAG
045-11-12 0121-03- 9
Req. separation => 24.1 <= 96.6 Actual separation 49.1 Short 47.5(25.0) km

SHORT TO: K33AG   33 BEND   OR BDFCDTT   20060330ADV
044-04-40 0121-19-49
Req. separation => 24.1 <= 96.6 Actual separation 77.2 Short 19.4(53.1) km

SHORT TO: K33AG   33 BEND   OR BLTTL   19871223ID
044-04-40 0121-19-49
Req. separation => 24.1 <= 96.6 Actual separation 77.2 Short 19.4(53.1) km

LANDMOBILE SPACING VIOLATIONS FOUND

NONE from Site # 01

Checks to Site Number 01

Proposed facility OK to FCC Monitoring Stations

Proposed facility OK toward West Virginia quiet zone

Proposed facility OK toward Table Mountain

Proposed facility is beyond the Canadian coordination distance

Proposed facility is beyond the Mexican coordination distance

Proposed station is OK toward AM broadcast stations

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Start of Interference Analysis

Proposed Station

Channel	Call	City/State	ARN
30	WARM	WARM SPRINGS OR	USERRECORD01

Stations Potentially Affected by Proposed Station

Chan	Call	City/State	Dist(km)	Status	Application	Ref. No.
15	KABH-CA	BEND OR	77.6	LIC	BLTTA	-20030131AJE
23	K23FS	SUNRIVER, ETC. OR	101.6	LIC	BLTT	-20040408AAW
26	K26AY	CORVALLIS, ETC. OR	137.5	LIC	BLTT	-20040909AAB
27	K27DO	BEND, ETC. OR	44.3	LIC	BLTTL	-19960507JL
28	K49KT-D	BEND OR	80.3	CP	BPTTL	-20090511AZL
28	K28CQ	HOOD RIVER OR	110.7	LIC	BLTT	-20100322ADF
29	KEPB-TV	EUGENE OR	170.2	LIC	BLEDT	-20050127AHY
29	K29CI	PRINEVILLE, ETC. OR	67.7	LIC	BLTT	-19911031SK
29	DK67AD	THE DALLES OR	105.2	CP	BDISTT	-20071121ACT
30	K30JS-D	YREKA CA	368.3	CP MOD	BMPDTT	-20080528ABH
30	K30BN	COOS BAY OR	275.6	CP	BDFCDTL	-20091102ACY
30	K30BN	COOS BAY OR	275.6	LIC	BLTT	-20030725ADE
30	NEW	EUGENE OR	163.9	APP	BNPDTL	-20100728ADJ
30	KBLN	GRANTS PASS OR	311.1	LIC	BLCDT	-20090224AAX
30	K30JT-D	LA PINE OR	125.3	LIC	BLDTT	-20100106ABC
30	K30EW	MONUMENT, ETC. OR	162.2	LIC	BLTTL	-19950818JD
30	K30EW	MONUMENT, ETC. OR	162.2	CP	BDFCDTL	-20090824ACH
30	K30EW	MONUMENT, ETC. OR	162.2	CP	BDFCDTL	-20060331BDB
30	NEW	ROSEBURG OR	243.0	APP	BNPDTL	-20090825BHI
30	K30IV	WALLOWA OR	311.9	LIC	BLTT	-20080902ABO
30	KPDX	VANCOUVER WA	143.3	CP MOD	BMPCDT	-20080619AGD
30	K30KA-D	WENATCHEE WA	286.0	CP	BDCCDTT	-20061030AGI
30	KUNW-LD	YAKIMA WA	204.3	LIC	BLDTL	-20090923ACQ
31	KLSR-TV	EUGENE OR	170.1	LIC	BLCDT	-20070104ADQ
31	K31CR-D	PRINEVILLE, ETC. OR	67.7	LIC	BLDTT	-20081016AEI
31	K31HK	RAINIER OR	198.2	CP	BDFCDTT	-20090821ACO
31	K31HK	RAINIER OR	198.2	LIC	BLTT	-20070502ABR
31	K31HZ-D	THE DALLES, ETC. OR	105.2	LIC	BLDTT	-20091125AAT
32	K32CC	MONTGOMERY RANCH,ETC OR	101.6	LIC	BLTT	-19881013IC
33	K33AG	BEND OR	77.3	LIC	BLTTL	-19871223ID
34	K34KE	HOOD RIVER OR	110.7	LIC	BLTT	-20100323AAM
34	K34KE	HOOD RIVER, ETC. OR	111.2	APP	BSTA	-20070815ABP
38	K38KV-D	HOOD RIVER OR	110.7	CP	BDISTT	-20070822ABB
38	K38DT	NORTH LAPINE OR	101.6	LIC	BLTT	-19930401JG

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Study of this proposal found the following interference problem(s):

NONE.

II. NIER Study

OET Bulletin 65 Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields (Edition 97-01) states in part that:

> When performing an evaluation for compliance with the FCC's RF guidelines all significant contributors to the ambient RF environment should be considered. . .For purposes of such consideration, significance can be taken to mean any transmitter producing more than 5% of the applicable exposure limit (in terms of power density or the square of the electric or magnetic field strength) at accessible locations.

As will be demonstrated below, the proposed operation will produce less than 5% of the applicable exposure limit for both controlled and uncontrolled environments. Thus, the proposed facility is categorically excluded from the requirement of further study. Therefore, pursuant to §1.1307(b)(3) of the Commission's Rules no calculations are required for the other FM and TV facilities in the vicinity, and precise calculations are made only with regard to the levels from this proposal.

The power density calculations shown below were made using the techniques outlined in OET Bulletin No. 65. "Ground level" calculations in this report have been made at a reference height of 2 meters above ground to provide a worst-case estimate of exposure for persons standing on the ground in the vicinity of the tower. The equation shown below was used to calculate the ground level power density figures from each antenna.

$$S(\mu W/cm^2) = \frac{33.40981 \times AdjERP(Watts)}{D^2}$$

Where: *AdjERP(Watts)* is the maximum lobe effective radiated power times the element pattern factor times the array pattern factor.

D is the distance in meters from the center of radiation to the calculation point.

Power density levels produced by the proposed facility were calculated for an elevation of 2 meters above ground (19 meters below the antenna radiation center). The worst case power density levels occur at depression angles between 45 and 90 degrees below the horizontal. The calculations in this report assume a worst-case relative field value of 0.200 at these angles, based on the manufacturer's vertical plane pattern for the horizontally-polarized Kathrein K723147 panel antenna array proposed in this application. This relative field value yields a worst-case adjusted average effective radiated power of 12 Watts at depression angles between 45 and 90 degrees below the horizontal. Assuming this power and the shortest distance between the antenna radiation center and 2 meters above ground level (i.e. straight down), the highest calculated power density from the

proposed antenna alone occurs at the base of the antenna support structure. At this point the power density is calculated to be 1.1 μW/cm², which is 0.3% of 379 μW/cm² (the FCC maximum for uncontrolled environments at the Channel 30 frequency).

These calculations show that the maximum calculated power density produced at two meters above ground level by the proposed operation alone is less than 5% of the applicable FCC exposure limit at all locations between 1 and 1000 meters from the base of the antenna support structure. Section 1.1307(b)(3) of the Commission's Rules excludes applications for new facilities or modifications to existing facilities from the requirement of preparing an environmental assessment when the calculated emissions from the applicants proposed facility are predicted to be less than 5% of the applicable FCC exposure limit. Therefore, the proposed facility is in compliance with Section 1.1301 et seq and no further analysis of non-ionizing radiation at this site is required in this application.

Pursuant to OET Bulletin No. 65, all station personnel and contractors are required to follow appropriate safety procedures before any work is commenced on the antenna tower, including reduction in power or discontinuance of operation before any maintenance work is undertaken. The permittee/licensee in coordination with other users of the site must reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency radiation in excess of FCC guidelines.

December 9, 2010
Erik C. Swanson, P.E.