

ENGINEERING EXHIBIT

Application for Minor Modification of Digital Low Power Television Station Construction Permit

prepared for

Gray Television Licensee, LLC

W31EV-D Wausau, WI

Facility ID 184339

Ch. 31 15 kW Nondirectional

Gray Television Licensee, LLC (“Gray”) is the proposed assignee of unbuilt digital Low Power Television station W31EV-D, Channel 31, Wausau WI, Facility ID 184339 (assignment file# 0000139122). W31EV-D is currently authorized to operate pursuant to a Construction Permit (“CP”, file# 0000071942) with 15 kW effective radiated power (“ERP”), nondirectional. The current CP was obtained as a displacement of the original authorization on Channel 38 (file# BNPDTL-20100202AAJ as callsign W38EX-D). *Gray* herein seeks a modification of the current CP to specify a different transmitting location for the Channel 31 facility.

The proposed facility will employ an existing antenna system that is top-mounted on the tower structure associated with FCC Antenna Structure Registration number 1066073, located 9.8 km (6.1 miles) from the current and original CP sites. No change to the overall structure height is proposed. The antenna supporting structure is partly owned by *Gray* and is utilized by *Gray’s* full-service television station WSAW-TV (Facility ID 6867, Wausau WI). The site is located more than 75 miles (121 km) from the reference coordinates of the markets listed in Appendix A of DA 09-1487¹.

The proposed antenna is a Dielectric model TFU-20GTH-R O4 having horizontal polarization. The ERP is 15 kW nondirectional using a “full service” out of channel emission mask. Figure 1 depicts the 51 dB μ coverage contour of the proposed facility as well as those of

¹“Commencement of Rural, First-come, First-served digital licensing for Low Power Television and TV Translators Beginning August 25, 2009 and Commencement of Nationwide, First-come, First-served Digital Licensing for Low Power Television and TV Translator Services Beginning January 25, 2010,” Public Notice, DA 09-1487, Released June 29, 2009.

the existing W31EV-D authorization (0000071942) and the original CP (file# BNPDTL-20100202AAJ) facility, demonstrating compliance with §73.3572 for a minor change.

Interference study per OET Bulletin 69² shows that the proposal complies with the FCC's interference protection requirements toward all digital television, television translator, LPTV, and Class A stations. 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 (Environmental)

The proposed facility 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 15 percent antenna relative field in downward elevations (pattern data shows 15 percent or less relative field at angles 20 to 90 degrees below the antenna), the calculated power density attributable to the proposed facility at locations near the transmitter site at a height of two meters above ground level is $0.3 \mu\text{W}/\text{cm}^2$, which is 0.1 percent of the general population / uncontrolled maximum permissible exposure limit. This is well 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.

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.

²FCC 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 1.0 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.

Engineering Exhibit
Gray Television Licensee, LLC (W31EV-D)
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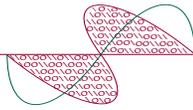
List of Attachments

Figure 1 Coverage Contour Comparison
Table 1 TVStudy Analysis of Proposal

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Figure 1
Coverage Contour Comparison
W31EV-D Wausau, WI
Facility ID 184339
Ch. 31 15 kW Nondirectional

prepared for
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April, 2021

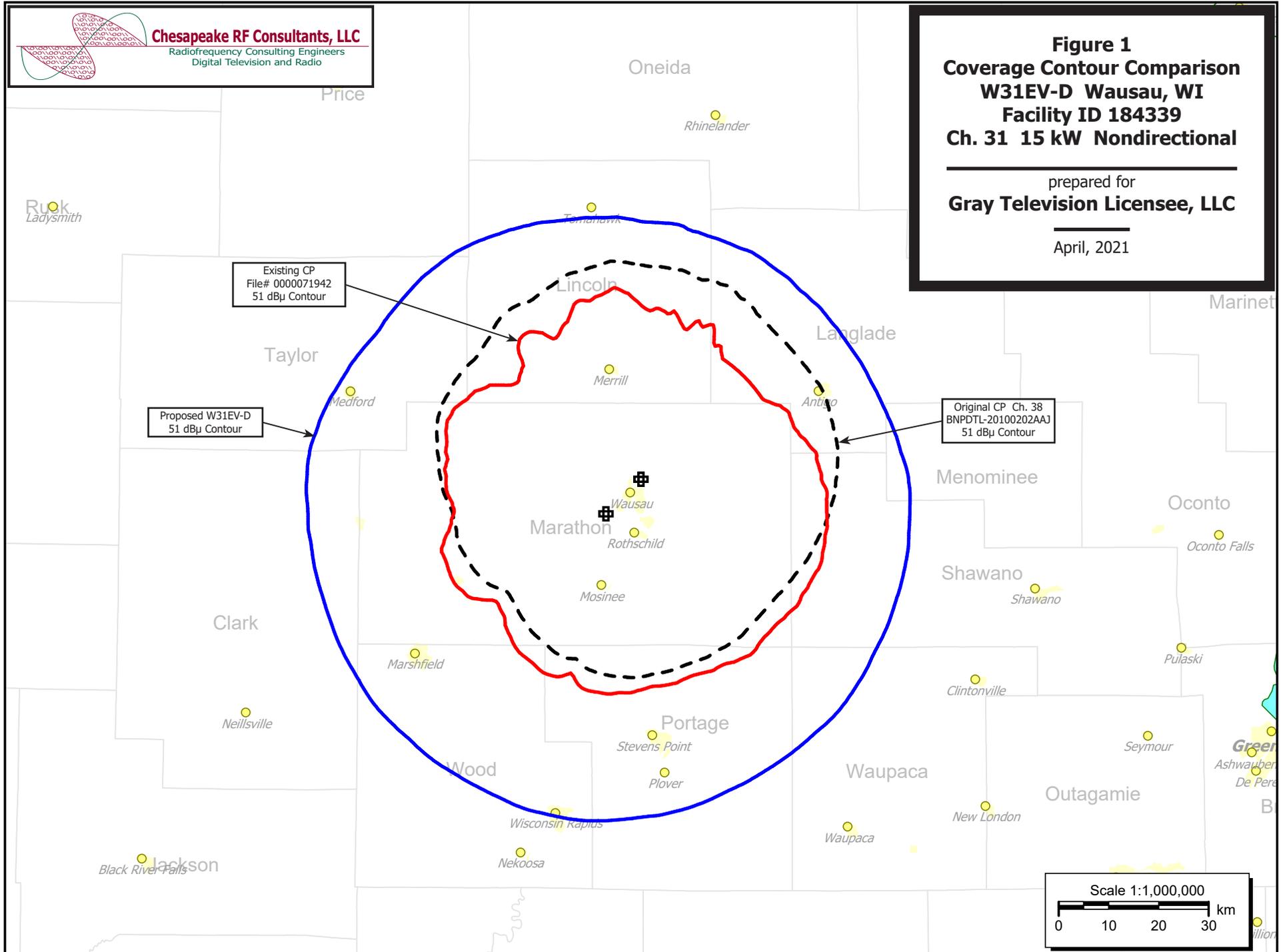


Table 1 W31EV-D TVStudy Analysis of Proposal
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tvstudy v2.2.5 (4uoc83)
Database: localhost, Study: W31EV-D prop, Model: Longley-Rice
Start: 2021.04.22 11:41:37

Study created: 2021.04.22 11:41:37

Study build station data: LMS TV 2021-04-21

Proposal: W31EV-D D31 LD APP WAUSAU, WI
File number: W31EV-D prop
Facility ID: 184339
Station data: User record
Record ID: 3612
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
No	KSTC-TV	D30	DT	LIC	MINNEAPOLIS, MN	BLANK0000080959	271.5 km
No	WEAU	D30	LD	LIC	EAU CLAIRE, WI	BLANK0000124038	182.3
No	W30EN-D	D30	LD	CP	EAU CLAIRE, WI	BLANK0000071871	138.6
No	W30DZ-D	D30	LD	LIC	FENCE, WI	BLANK0000060424	134.0
No	W30BU	D30+	LD	CP	GREEN BAY, WI	BLANK0000072177	148.6
No	W30BU	N30+	TX	LIC	GREEN BAY, WI	BLTTL20030923AAD	148.7
No	WPXE-TV	D30	DT	LIC	KENOSHA, WI	BLANK0000087614	248.9
No	K31NJ-D	D31	LD	LIC	LANSING, IA	BLANK0000093973	213.0
No	WFLD	D31	DT	LIC	CHICAGO, IL	BLANK0000055195	376.6
No	W31EZ-D	D31	LD	LIC	CHICAGO, IL	BLANK0000124951	375.1
No	WESV-LD	D31	LD	LIC	CHICAGO, IL	BLANK0000125079	375.1
No	WQAD-TV	D31	DT	LIC	MOLINE, IL	BLANK0000120809	404.9
No	W31DT-D	D31	LD	CP	STERLING - DIXON, IL	BDCDDL20110726AJF	336.1
No	WNIT	D31	DT	LIC	SOUTH BEND, IN	BLANK0000087078	464.1
No	W38FO-D	D31	LD	APP	ELMHURST, MI	BLANK0000143601	370.6
No	WMKG-CD	D31	DC	LIC	MUSKOGON, MI	BLANK0000107817	338.9
No	K31EF-D	D31	LD	LIC	FROST, MN	BLDPT20090730ACQ	368.5
No	WRPT	D31	DT	LIC	HIBBING, MN	BLEDT20090603AAV	371.3
No	WDMI-LD	D31	LD	LIC	MINNEAPOLIS, MN	BLDTL20100809CIU	274.4
Yes	KARE	D31	DT	CP	MINNEAPOLIS, MN	BLANK0000135138	271.5
No	K31LN-D	D31	LD	CP	ROCHESTER, MN	BNPDTL20100309AAW	239.9
No	K31KX-D	D31	LD	CP	ST CHARLES, MN	BNPDTL20090825BXU	211.1
Yes	W31DN-D	D31	LD	CP	EAU CLAIRE, WI	BNPDTL20090825AYR	138.6
Yes	K31GH-D	D31-	LD	LIC	HAYWARD, WI	BLANK0000016624	179.4
No	K31GH-D	N31-	TX	LIC	HAYWARD, WI	BLTTL20020729AAS	179.3
Yes	WITI	D31	DT	LIC	MILWAUKEE, WI	BLANK0000086971	248.9
No	WJMN-TV	D32	DT	LIC	ESCANABA, MI	BLANK0000063727	252.6
No	W32CV-D	D32+	LD	LIC	IRONWOOD, MI	BLANK0000016623	173.4
No	W32CV-D	N32+	TX	LIC	IRONWOOD, MI	BLTT20040217ACE	173.4
No	WCCO-TV	D32	DT	LIC	MINNEAPOLIS, MN	BMLCDT20120907ABQ	271.5
No	W32DW-D	D32	LD	CP	LA CROSSE, WI	BNPDTL20090825CAP	175.2
No	WTMJ-TV	D32	DT	LIC	MILWAUKEE, WI	BLANK0000086939	248.6
No	K18NQ-D	N32-	TX	LIC	RHINELANDER, WI	BLTT20050929AGL	101.1

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

Channel: D31
Mask: Full Service
Latitude: 44 55 14.20 N (NAD83)
Longitude: 89 41 28.70 W
Height AMSL: 769.1 m
HAAT: 0.0 m
Peak ERP: 15.0 kW
Antenna: Omnidirectional
Elev Pattn: Generic

Table 1 W31EV-D TVStudy Analysis of Proposal
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Elec Tilt: 0.50

50.4 dBu contour:

Azimuth	ERP	HAAT	Distance
0.0 deg	15.0 kW	369.4 m	59.7 km
45.0	15.0	372.8	59.8
90.0	15.0	401.3	61.2
135.0	15.0	398.6	61.1
180.0	15.0	413.3	61.9
225.0	15.0	382.7	60.3
270.0	15.0	377.8	60.1
315.0	15.0	365.7	59.5

Database HAAT does not agree with computed HAAT
Database HAAT: 0 m Computed HAAT: 385 m

Distance to Canadian border: 340.5 km

Distance to Mexican border: 1971.7 km

Conditions at FCC monitoring station: Allegan MI
Bearing: 129.3 degrees Distance: 395.1 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:
Bearing: 252.8 degrees Distance: 1375.4 km

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 BLANK0000135138 CP scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	KARE	D31	DT	CP	MINNEAPOLIS, MN	BLANK0000135138	
Undesireds:	W31EV-D	D31	LD	APP	WAUSAU, WI	W31EV-D prop	271.5 km
	KSTC-TV	D30	DT	LIC	MINNEAPOLIS, MN	BLANK0000080959	0.0
	WRPT	D31	DT	LIC	HIBBING, MN	BLEDT20090603AAY	258.2
	Service area		Terrain-limited		IX-free, before	IX-free, after	Percent New IX
	39730.0	3,865,802	39133.1	3,856,160	39116.0	3,855,504	39084.8 3,855,363 0.08 0.00
Undesired			Total IX		Unique IX, before	Unique IX, after	
W31EV-D	D31	LD	APP	31.3	141	31.3	141
KSTC-TV	D30	DT	LIC	2.0	14	2.0	14
WRPT	D31	DT	LIC	15.1	642	15.1	642

Interference to BNPDTL20090825AYR CP scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	W31DN-D	D31	LD	CP	EAU CLAIRE, WI	BNPDTL20090825AYR	
Undesireds:	W31EV-D	D31	LD	APP	WAUSAU, WI	W31EV-D prop	138.6 km
	KARE	D31	DT	CP	MINNEAPOLIS, MN	BLANK0000135138	138.2
	K31GH-D	D31-	LD	LIC	HAYWARD, WI	BLANK0000016624	137.3
	Service area		Terrain-limited		IX-free, before	IX-free, after	Percent New IX
	1721.6	130,655	1687.4	130,112	1482.8	124,417	1482.8 124,417 0.00 0.00
Undesired			Total IX		Unique IX, before	Unique IX, after	
W31EV-D	D31	LD	APP	2.0	17	0.0	0
KARE	D31	DT	CP	204.6	5,695	202.6	5,678

Interference to BLANK0000016624 LIC scenario 1

Table 1 W31EV-D TVStudy Analysis of Proposal
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Call	Chan	Svc	Status	City, State	File Number	Distance
Desired: K31GH-D	D31-	LD	LIC	HAYWARD, WI	BLANK0000016624	
Undesireds: W31EV-D	D31	LD	APP	WAUSAU, WI	W31EV-D prop	179.4 km
KARE	D31	DT	CP	MINNEAPOLIS, MN	BLANK0000135138	170.5
W32CV-D	D32+	LD	LIC	IRONWOOD, MI	BLANK0000016623	105.5
Service area	Terrain-limited	IX-free, before	IX-free, after	Percent New IX		
5083.3 29,466	5021.0	29,131	4776.5 27,101	4776.5 27,101	0.00	0.00
Undesired		Total IX	Unique IX, before	Unique IX, after		
W31EV-D D31 LD APP	1.0	0	0.0	0		
KARE D31 DT CP	244.5	2,030	244.5	2,030	243.5	2,030

Interference to BLANK0000086971 LIC scenario 1

Call	Chan	Svc	Status	City, State	File Number	Distance
Desired: WITI	D31	DT	LIC	MILWAUKEE, WI	BLANK0000086971	
Undesireds: W31EV-D	D31	LD	APP	WAUSAU, WI	W31EV-D prop	248.9 km
WQAD-TV	D31	DT	LIC	MOLINE, IL	BLANK0000120809	284.3
WNIT	D31	DT	LIC	SOUTH BEND, IN	BLANK0000087078	215.9
WMKG-CD	D31	DC	LIC	MUSKEGON, MI	BLANK0000107817	137.0
WLPD-CD	D32	DC	LIC	PLANO, IL	BLANK0000113895	140.0
WTMJ-TV	D32	DT	LIC	MILWAUKEE, WI	BLANK0000086939	0.4
Service area	Terrain-limited	IX-free, before	IX-free, after	Percent New IX		
26841.9 3,111,623	26616.3	3,096,558	26204.9 3,072,868	26162.3 3,062,021	0.16	0.35
Undesired		Total IX	Unique IX, before	Unique IX, after		
W31EV-D D31 LD APP	50.7	10,887	42.5	10,847		
WQAD-TV D31 DT LIC	393.3	23,330	375.2	22,997	371.1	22,988
WNIT D31 DT LIC	13.1	243	3.0	134	1.0	118
WMKG-CD D31 DC LIC	8.1	94	1.0	1	1.0	1
WTMJ-TV D32 DT LIC	20.1	448	13.1	210	13.1	210

Interference to proposal scenario 1

Call	Chan	Svc	Status	City, State	File Number	Distance
Desired: W31EV-D	D31	LD	APP	WAUSAU, WI	W31EV-D prop	
Undesireds: W30BU	D30+	LD	CP	GREEN BAY, WI	BLANK0000072177	148.6 km
KARE	D31	DT	CP	MINNEAPOLIS, MN	BLANK0000135138	271.5
K31GH-D	D31-	LD	LIC	HAYWARD, WI	BLANK0000016624	179.4
WITI	D31	DT	LIC	MILWAUKEE, WI	BLANK0000086971	248.9
Service area	Terrain-limited	IX-free	Percent IX			
11493.3 314,024	11481.2	313,846	11473.2 313,748	0.07	0.03	
Undesired		Total IX	Unique IX	Prcnt Unique IX		
KARE D31 DT CP	2.0	0	0	0.02	0.00	
WITI D31 DT LIC	6.0	98	6.0	98	0.05	0.03