Understanding the September 2000 U.S.-Canada DTV LOU

by Dane E. Ericksen, P.E., CSRTE
Hammett & Edison, Inc.

On September 22, 2000, the United States and Canada adopted an agreement implementing digital television ("DTV") service in each country's border area. This Letter of Understanding ("LOU") has the potential to impact U.S. broadcasters having non-checklist DTV applications within 400 kilometers of the Canadian border. As shown by **Figure 1**, this includes such sites as the World Trade Center and Empire State Building in New York City; the Sears Tower and the Hancock Building in Chicago; Queen Anne Hill in Seattle; Healy Heights in Portland; and even Charleston, West Virginia, and Hagerstown, Maryland.

It is the purpose of this article to provide an overview of the LOU. U.S. DTV stations in the border area contemplating a non-checklist DTV application would be prudent to have their consulting engineer review their particular situation with respect to the Canadian DTV LOU while the project is still in its early stages. Broadcasters with pending non-checklist DTV applications may also wish to check the impact of the now finalized LOU. A copy of the as-adopted LOU can be obtained from the Hammett & Edison web site, www.h-e.com.

The LOU grandfathers each country's DTV Table of Allotments; therefore, U.S. broadcasters with checklist DTV applications should not be affected by the LOU. It is only non-checklist applications, such as "maximization" proposals, or proposed changes to the U.S. DTV Table of Allotments, that may be impacted by the LOU.

Three-Step Process

The LOU adopts a three-step process for determining whether a U.S. station's proposed DTV facility would be acceptable to Canada. The First Step involves a simple transmitter-to-transmitter spacing test; if the separation requirement is met, the U.S. DTV station need not concern itself further. If the First Step test is not satisfied, then a Second Step test, to see whether the U.S. station's interfering contour clears a protected radius around the Canadian DTV allotment is performed; again, if this criterion is satisfied, the proposed DTV facility should be deemed as acceptable by Canada. If both the First Step and Second Step tests are not met, then a Third Step OET-69 style study may be performed. If that study shows no more than a 2% increase in interference to the Canadian DTV allotment, or to an existing Canadian NTSC station, Canada should again accept the proposal. Finally, the LOU allows Canada to nevertheless accept a U.S. DTV proposal even if the First, Second, and Third Step tests are not met, although Industry Canada staff would be under no obligation to do so.

First Step Test: Transmitter-to-Transmitter Spacing

Unfortunately, the First Step transmitter-to-transmitter spacing requirements are roughly double those adopted by the FCC for domestic DTV-to-DTV and DTV-to-NTSC spacings. For example, in the U.S. two co-channel full-power and full-height UHF DTV stations (equivalent to Canadian Class VL) would, after the end of the transition period[1], require a separation of 196.3 kilometers if in Zone I, and 223.7 kilometers if in Zones II or III. By comparison, the LOU requires a spacing of 386 kilometers between a full-power and full-height U.S. UHF DTV station (*i.e.*, 1000 kW ERP at 365 meters HAAT) and a

[1] For the initial U.S. domestic DTV Table of Allotments, modifications are based on OET-69 interference studies, and spacings are irrelevant. However, after the end of the transition period (tentatively in 2006), U.S. domestic DTV allocations will change to simple transmitter-to-transmitter spacings.

co-channel Canadian Class A DTV allotment, which is the smallest class of Canadian DTV allotments. (Canada has given DTV allotments to all of its low power NTSC stations, in addition to its full-power NTSC stations; in effect, Canada has given DTV allotments to all of its LPTV stations.)

The LOU defines five classes of Canadian DTV allotments; at UHF, these parameters are as follows:

Class	ERP	HAAT	Protected Radius	Distance to F(50,10) 12.4 dBu contour
A	0.2 kW	100 m	25 km	135.9 km
B	4	150	45	218.2
C	75	300	70	319.6
VU	550	300	82	386.6
VL	1000	325	89	409.6

In order to determine whether a U.S. DTV station meets the very large First Step spacing test, the equivalent Canadian class of the U.S. station must first be determined. The author's firm does this by taking the U.S. DTV station's main-beam ERP and 8-radial HAAT, and determining the distance to the F(50,10) 12.4 dBu contour (at UHF; other contour levels would apply for VHF lowband and VHF highband DTV proposals). The U.S. DTV's equivalent Canadian class is then determined by consulting the above table. For example, if the U.S. DTV station has a distance to its F(50,10) 12.4 dBu contour of, say, 395 kilometers, it would be considered Canadian Class VU; if the distance to the 12.4 dBu contour is in excess of 409.6 kilometers it would be considered Canadian Class VL. The attached **Figures 2A and 2B** show spacing conditions for U.S. DTV stations at Bellevue, Washington, and Jamestown, New York; the solid arcs show the Canadian DTV LOU required spacings, and the dashed arcs show the spacing requirements that would be acceptable in the U.S.

Second Step Test: Contours

If a U.S. DTV station cannot pass the First Step spacing test, it then needs to project its interfering contour toward Canada to see whether that contour clears the protected circle surrounding all co-channel and adjacent-channel Canadian DTV allotments. Canadian NTSC stations also need to be checked.

In the U.S., the UHF co-channel interfering contour is the dipole-adjusted F(50,10) 26 dBu; that is, 15 dB below the 41 dBu F(50,90) DTV protected contour (again, plus or minus up to a 2.3 dB dipole factor). However, Industry Canada decided that this was not good enough for their DTV stations, and instead chose an F(90,90) 39 dBu contour and no dipole factor. Industry Canada also determined that a 19.5 dB co-channel desired-to-undesired ("D/U") protection ratio was needed and that the F(10,10), rather than the F(50,10), curves should be used when projecting the interfering contour. The LOU specifies that to convert from the F(50,10) to the F(10,10) curves a value of 7.1 dB shall be subtracted from the desired field strength value, thus resulting in a rather incredible 4.2 μVolt/meter (12.4 dBu) interfering contour. Thus, the interfering contour that U.S. UHF DTV stations must use when performing the Second Step contour protection test is over four times (13.6 dB) more stringent than the Advanced Television Systems Committee (ATSC) and the FCC found to be adequate for U.S. DTV stations. Because the F(50,10) 12.4 dBu contour of a high-power U.S. DTV station can go halfway to the Arctic Circle, many U.S. DTV stations will fail the Second Step test. The attached **Figures 3A and 3B** demonstrate the Second Step tests for Bellevue and Jamestown; the solid line shows the interfering contour mandated by the Canadian DTV LOU, and the dashed line shows the interfering contour that would apply in the U.S.

Finally, the LOU has one more "gotcha" for U.S. broadcasters: when projecting coverage of a U.S. DTV signal into Canada, 3-second Canadian Digital Elevation Data (CDED) must be used. CDED costs $250 Canadian ($165 U.S.) per block, and approximately 168 blocks of such terrain data would be needed to cover the entire border area. Even applying the 30% discount for a bulk purchase and converting to U.S. dollars, this represents an expense of more than $19,000 U.S. In contrast, the LOU allows Canadian DTVs to use USGS 3-second terrain data when projecting their interfering signal into the United States, but Canadian DTV stations and consulting engineers can get that terrain data for free from the USGS internet site.

Third Step: OET-69 Style Interference Study

The November 15, 1999, version of the LOU did not include any provision for "*de minimus*" interference to Canadian NTSC stations and DTV allotments, and would have been a serious impediment to border-area U.S. DTV stations had it been adopted. In a series of e-mails the author had with Industry Canada, after obtaining a copy of the November 1999 "finalized" LOU, it was revealed that Industry Canada's position was that "*de minimus*" interference would not apply to Canadian NTSC stations and DTV allotments. Further, Industry Canada was unable to confirm how Longley-Rice Error Code 3 ("EC3")[2] cells were to be treated, how the depression angles to cells were to be calculated, and whether generic or actual transmitting antenna elevation patterns were to be used. These are all factors that can have significant impacts on the outcome of an OET-69 style interference study. Industry Canada's instructions were to "use your best engineering judgment and state your assumptions;" Industry Canada would then "consider" each interference study on a case-by-case basis. Given the much more

[2] For an explanation of EC3 cells, see Section II of the August 26, 1999, Hammett & Edison MM Docket 00-39 DTV Review comments, available on the FCC Electronic Comments Filing System ("ECFS") and on the H&E web site.

stringent nature of the First Step spacing requirements and the Second Step contour protection criteria, the lack of a "*de minimus*" criteria would have been devastating to many, if not most, U.S. border area DTV stations needing to propose non-checklist facilities, and could also have seriously impacted U.S. border area NTSC stations needing to make minor-change modifications. Further, the fuzziness of the LOU concerning critical OET-69 implementation details, which can significantly impact the study results, and which have been hammered out over the past three years in the U.S., made this writer wonder just what purpose the LOU would accomplish if such critical details were to be left to Industry Canada staff to decide on an *ad hoc* basis.

February and April 2000 Meetings at the FCC

As a result of these concerns[3] about the November 1999 version of the LOU, awaiting only Chairman Kennard's signature for consummation, a meeting was held at the FCC on February 18, 2000. Senior level FCC International Bureau, Mass Media Bureau, and Office of Science & Technology staff were present for the FCC. NAB, MSTV and ALTV had representatives at the meeting, as did AFCCE and Belo Broadcasting, Gannett Broadcasting, Granite Broadcasting, and Tribune Broadcasting. Due to other travel commitments the author participated in this meeting by speakerphone. As a result of this meeting, FCC staff agreed to hold the LOU in abeyance until further studies of its impact on U.S. border-area TV stations could be made. FCC staff also disclosed that Industry Canada had so far approved 106 U.S. border area DTV applications and had objected to three applications. Of the 106 "approved" applications, 35 were "non-checklist." International Bureau staff agreed to provide a list of these stations, so that they could be studied pursuant to the proposed LOU.

---

[3] An engineering study documenting the LOU problem areas was filed with Chairman Kennard's office on February 7, 2000. A copy of this engineering analysis, "Engineering Exhibit Regarding the Proposed November 15, 1999, U.S.-Canada DTV Letter of Understanding," can be found as an Adobe Acrobat pdf file at the Hammett & Edison web site.

The author's firm then studied the subset of 35 border-area, non-checklist DTV applications approved by Industry Canada, plus the three border-area non-checklist DTV applications objected to by Industry Canada. First Step (spacings) tests were made on all 38 cases, and, where appropriate, so were Second Step (contour) tests and Third Step (OET-69 style interference study) tests. Surprisingly, the further Second Step studies revealed no fewer than ten instances of Canadian DTV allotments at spacings less than the LOU requires of U.S. DTV stations. One wonders whether Industry Canada (or the FCC) recognized the double-standard of using lesser Canadian DTV-to-Canadian DTV spacings domestically but applying much greater spacings to U.S. DTV stations. For example, there are only 89.9 kilometers between a Canadian Class B D50 allotment for Powell River, British Columbia, and a D50 Class B allotment for Nanaimo, British Columbia, whereas the LOU requires a U.S. DTV station to provide a separation of 175 kilometers. Similarly, a Canadian D27 Class VU allocation for Midland, Ontario, is only 314.1 kilometers from a Canadian D7 Class C allocation for Sarnia, Ontario, whereas the LOU requires a U.S. broadcaster to provide a separation of 340 kilometers. This further study also made it apparent that Industry Canada has created a multitude of "short-spaced" co-channel DTV allotments close to the U.S. border, even though the April 1997 U.S. DTV Table of Allotments preceded by approximately two years the Canadian DTV Table of Allotment, which was first posted to the Industry Canada web page in April of 1999. Under the terms of the initially-drafted LOU, without any "*de minimus*" allowance, these short-spaced Canadian DTV allotments would have effectively "frozen" short-spaced U.S. DTV stations.

The Third Step studies made the following assumptions:

- Where the LOU values differ from U.S. OET-69 values, the LOU parameters were used; for example, the "Canadian" version uses a co-channel DTV-into-DTV desired-to-undesired ratio of 19.5 dB, rather than 15 dB, and uses the F(90,90) 39 dBu contour for the UHF DTV

coverage threshold (without a dipole factor) rather than the F(50,90) 41 dBu contour adjusted by a dipole factor of up to ±2.3 dB.

- Use of VHF low-band, VHF high-band, and UHF receiving antenna patterns per CCIR Recommendation 419-3 rather than the directional receiving antenna patterns derived from the FCC's OET-69 source code.
- Use of the generic OET-69 elevation patterns given in Table 8 of OET-69.
- Use of 30-second terrain data rather than 3-second CDED.
- Use of LOU Appendix 3, Table 4.3.2, "After Transition" maximum parameters for Canadian DTV allotments.
- No masking of cells by either Canadian NTSC or U.S. NTSC TV stations.
- Masking of cells by interfering Canadian DTV allotments, and masking of cells by un-modified U.S. DTV allotments.
- Where a "third party" U.S. DTV station has a channel relationship and location that triggers inclusion of the third-party station, the allotted facilities of the third-party station were presumed in all cases.
- No culling of cells; that is, all cells of any Canadian DTV allotment not meeting the First Step transmitter-to-transmitter spacings were studied.
- Calculation of depression angles based on the transmitting antenna's height AMSL rather than its height AGL (*i.e.*, the OET-69 depression angle calculation error was *not* propagated).[4]

[4] For an explanation of the depression angle calculation error still present in the FCC's OET-69 computer program, see Section III of the August 26, 1999, Hammett & Edison MM Docket 87-268 Biennial Review comments, available on the FCC Electronic Comments Filing System ("ECFS") and on the H&E web site. Also see the two-part article in the September/October 1999 issues of *Television Broadcast* magazine, "DTV: Gold Mine or Land Mine?" This article is also available on the H&E web site.

All of these assumptions can affect Third Step OET-69 style interference study results, some more so than others. The author believes that these are the most reasonable assumptions possible, based upon available information and that they are consistent with instructions received from Industry Canada staff, in response to e-mails posing specific questions regarding Third Step interference studies.

To gain insight into the impact of Longley-Rice EC3 cells in Canada, all of the U.S. DTV applications (or permits) requiring Third Step studies were studied twice: initially ignoring EC3, and then a second time, respecting EC3 (*i.e.*, applying the FCC policy for domestic DTV stations/allotments). Again for Station KBEH-DT, Channel D50 at Bellevue, **Figures 4A and 4B** show an OET-69 study where EC3 is ignored (all cells studied), and **Figures 4C and 4D** show an OET-69 study where EC3 cells are respected; that is, "free parking." For KBEH-DT the results were the same in both cases, demonstrating that EC3 cells don't necessarily mean that the results are in error, only that they are uncertain. In contrast, for Station WNYB-DT, Channel D27 at Jamestown, **Figures 5A and 5B** show an OET-69 study where EC3 cells are respected, and **Figures 5C and 5D** show an OET-69 study where EC3 is ignored. This time there is a difference between the two approaches: ignoring EC3 cells shows interference increases of 4.1% to the Canadian D27 allotment for Midland and 1.4% to the Canadian D27 allotment for Sarnia. Whereas respecting EC3 cells results shows interference increases of only 0.7% for Midland and 1.4% (no change) for Sarnia. Thus, had the LOU been in effect when Industry Canada approved the WNYB-DT application, and had Industry Canada chosen to ignore EC3 warnings and study all cells inside the protected allotments, the 2% *de minimus* criteria would not have been met, and Industry Canada would have been under no obligation to have approved the application (since granted by the FCC?).

Of the 35 non-checklist, border-area U.S. DTV stations approved by Industry Canada, 28 passed the First Step spacing test; that is, they were fortunate enough not to have any short-spaced Canadian DTV allotments. Of the seven approved applications not meeting the First Step test, six also failed the Second Step contour test. Of these six, three turned out to increase the Canadian populations receiving interference, ranging from 0.8% to 30.8%, depending on whether cells returning EC3 were ignored or honored. An interesting question, then, is did Industry Canada staff realize the magnitudes of the new interference to Canadian DTV allotments when they approved these border-area, non-checklist U.S. DTV applications? If "yes," then this suggests that Industry Canada will be liberal in granting approvals to U.S. DTV stations that fail all three tests. If "no," then it may be that these stations represent a lucky few that got approved, perhaps mistakenly, before the LOU was adopted. Based on e-mails with Industry Canada staff, the author suspects that Industry Canada does not currently have the software capability to conduct OET-69 style studies, and that some of the approvals may have been inadvertent.

Finalized LOU

This further analysis of the proposed Canadian DTV LOU was filed with the FCC on March 16, 2000,[5] and there was a second meeting held at the FCC on April 24, 2000, to discuss needed changes to ensure that U.S. broadcasters would be better protected. At that meeting, FCC staff reported that Industry Canada had changed its position and agreed to accept a 2% "*de minimus*" interference criteria. This was a tremendous victory for U.S. TV broadcasters, as it largely moots the much stricter First Step spacing test and the Second Step contour test, since it makes the change in interference the determining

[5] A copy of this engineering analysis, "Further Engineering Evaluation of the November 15, 1999, U.S.-Canada DTV Letter of Understanding," can be found as a pdf file on the Hammett & Edison web site.

factor; that is, although a large number of U.S. border-area DTV stations will fail the First Step and Second Step tests, they now have a much greater likelihood of passing the Third Step test. The LOU was also modified to address U.S. broadcasters that received out-of-core DTV allotments (the initial version of the LOU did not even discuss such stations).

Unfortunately, the as-signed LOU ended up not incorporating language addressing the many OET-69 style interference study issues, such as EC3 cells, depression angle calculation, and cell masking by existing stations (both Canadian and U.S.). These items are left to the discretion of Industry Canada staff, and so there is still some uncertainty whether a non-checklist U.S. DTV application within the border area that needs to submit a Third Step OET-69 style interference study will have that study accepted. Nevertheless, the as-adopted version of the LOU is a tremendously better agreement for U.S. broadcasters than the almost-adopted, November 15, 1999, version. If there is any lesson to be learned, it is that the FCC needs to treat LOUs as if they are rule makings subject to the Administrative Procedures Act, and place the text of such proposed agreements out for public comment before they are adopted. Doing so will give FCC staff the benefit of engineering review by interested third parties that can alert FCC staff to possible problem areas before an LOU gets signed.

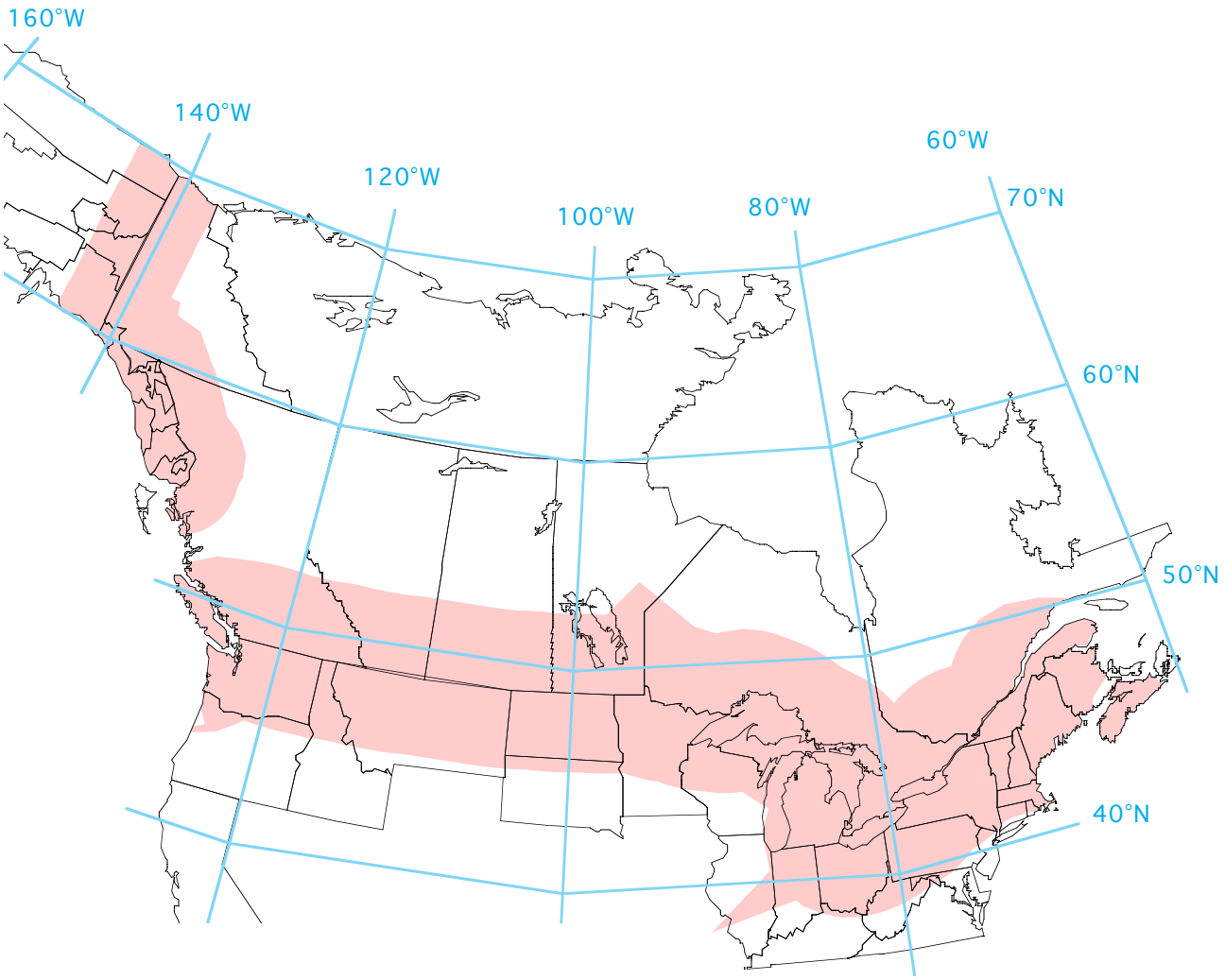
[approximately 3,300 words]

About the Author

Dane E. Ericksen is a senior engineer with Hammett & Edison, Inc., Consulting Engineers, with offices near San Francisco. Prior to joining H&E in 1982, Mr. Ericksen worked from 1970 to 1982 at the FCC's San Francisco field office, and was an FM/TV/Cable Specialist in charge of the Commission's Western FM/TV Enforcement Unit. Mr. Ericksen serves on the SBE Board of Directors, the NAB/SBE Engineering Conference Committee, the SBE Certification Committee, and Chairs the SBE FCC Liaison Committee, which has responsibility for drafting all national-level SBE filings with the FCC and other regulatory bodies. Mr. Ericksen is a Registered Professional Engineer and is SBE certified at the Senior Broadcast Engineer levels in both Radio and Television.

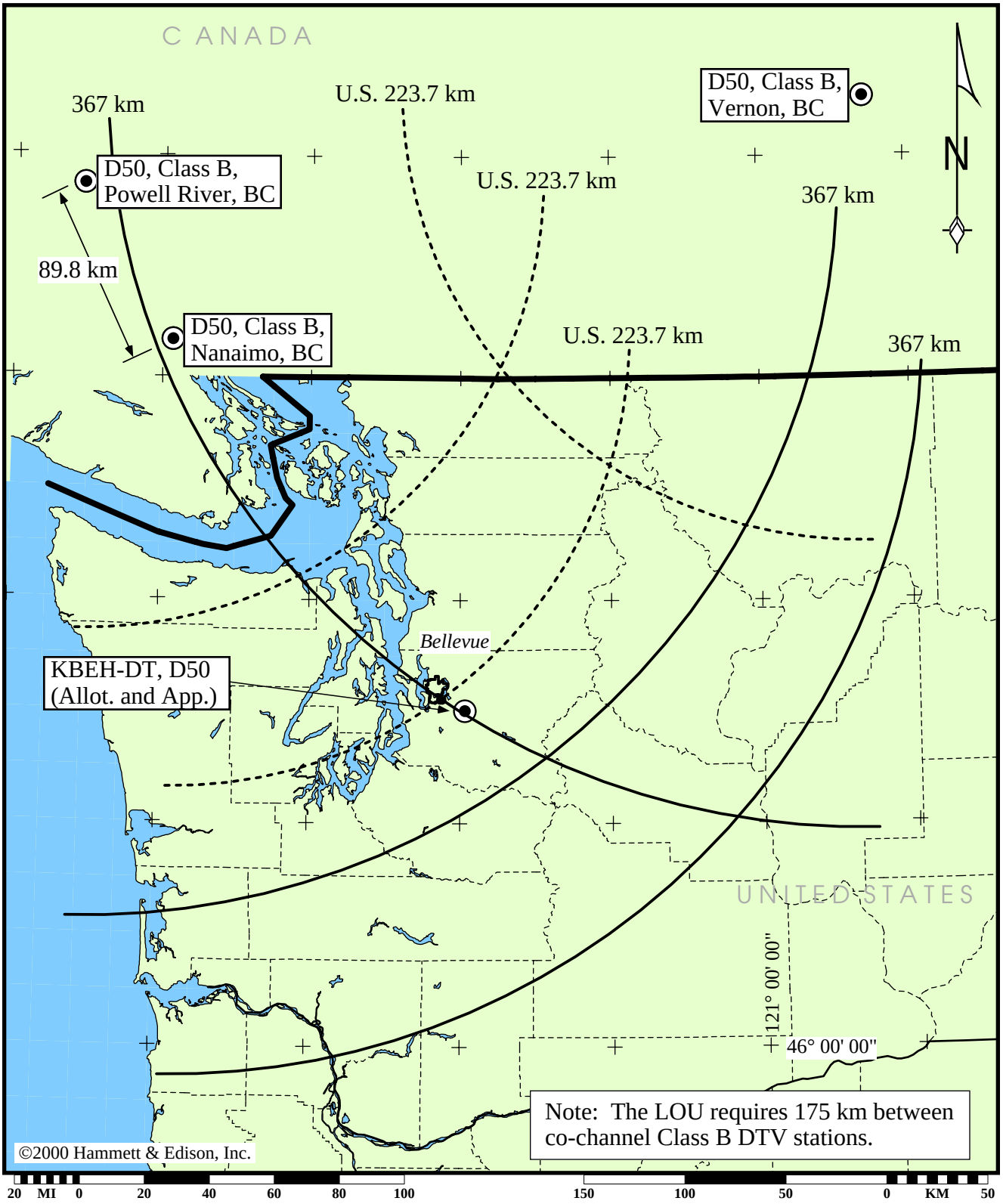
Understanding the September 2000 U.S.-Canadian DTV LOU

Areas Subject to the U.S.-Canadian DTV LOU
(Areas within 400 kilometers of the Border)



Understanding the September 2000 U.S.-Canadian DTV LOU

Station KBEH-DT, D50, Bellevue, Washington
First-Step Spacings Test



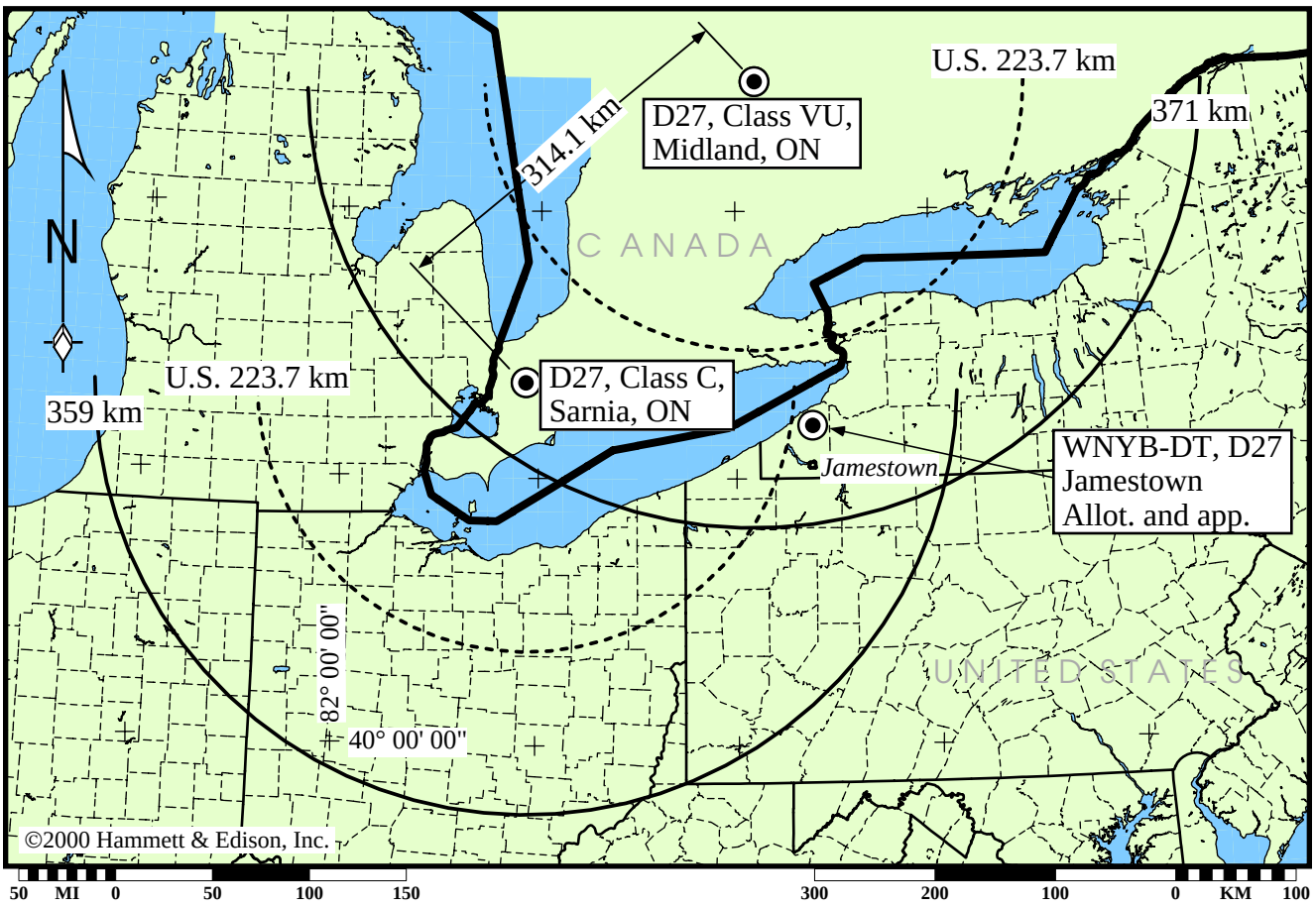
Map data taken from Sectional Aeronautical Charts, published by the National Ocean Survey. City limits shown taken from 1995 U.S. Census Bureau TIGER data. Geographic coordinate marks shown at 60-minute increments.

HAMMETT & EDISON, INC.
CONSULTING ENGINEERS
SAN FRANCISCO

001007
Figure 2A

Understanding the September 2000 U.S.-Canadian DTV LOU

Station WNYB-DT, D27, Jamestown, New York
First-Step Spacings Test

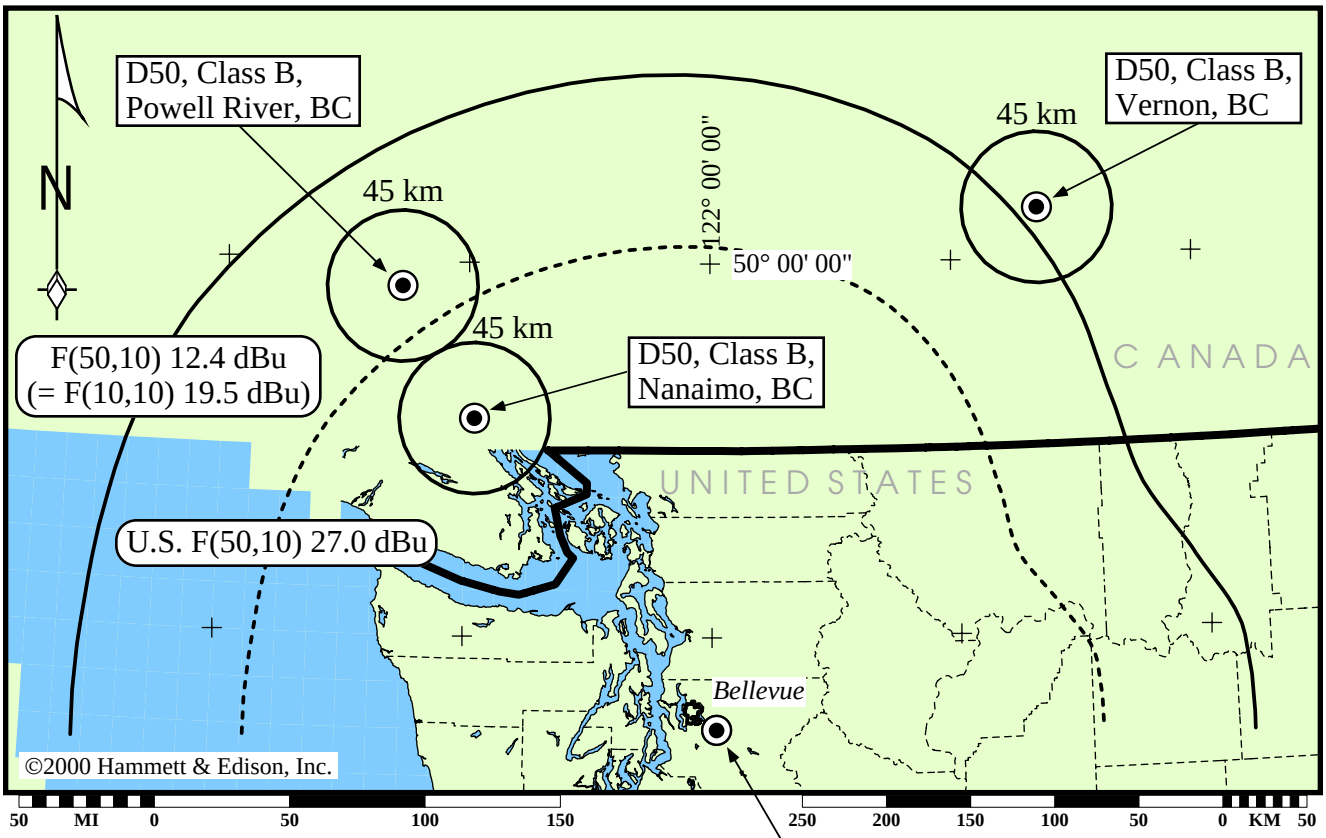


Note: The LOU requires 340 km between co-channel Class VU and Class C DTV stations.

Map data taken from Sectional Aeronautical Charts, published by the National Ocean Survey. City limits shown taken from 1995 U.S. Census Bureau TIGER data. Geographic coordinate marks shown at 120-minute increments.

Understanding the September 2000 U.S.-Canadian DTV LOU

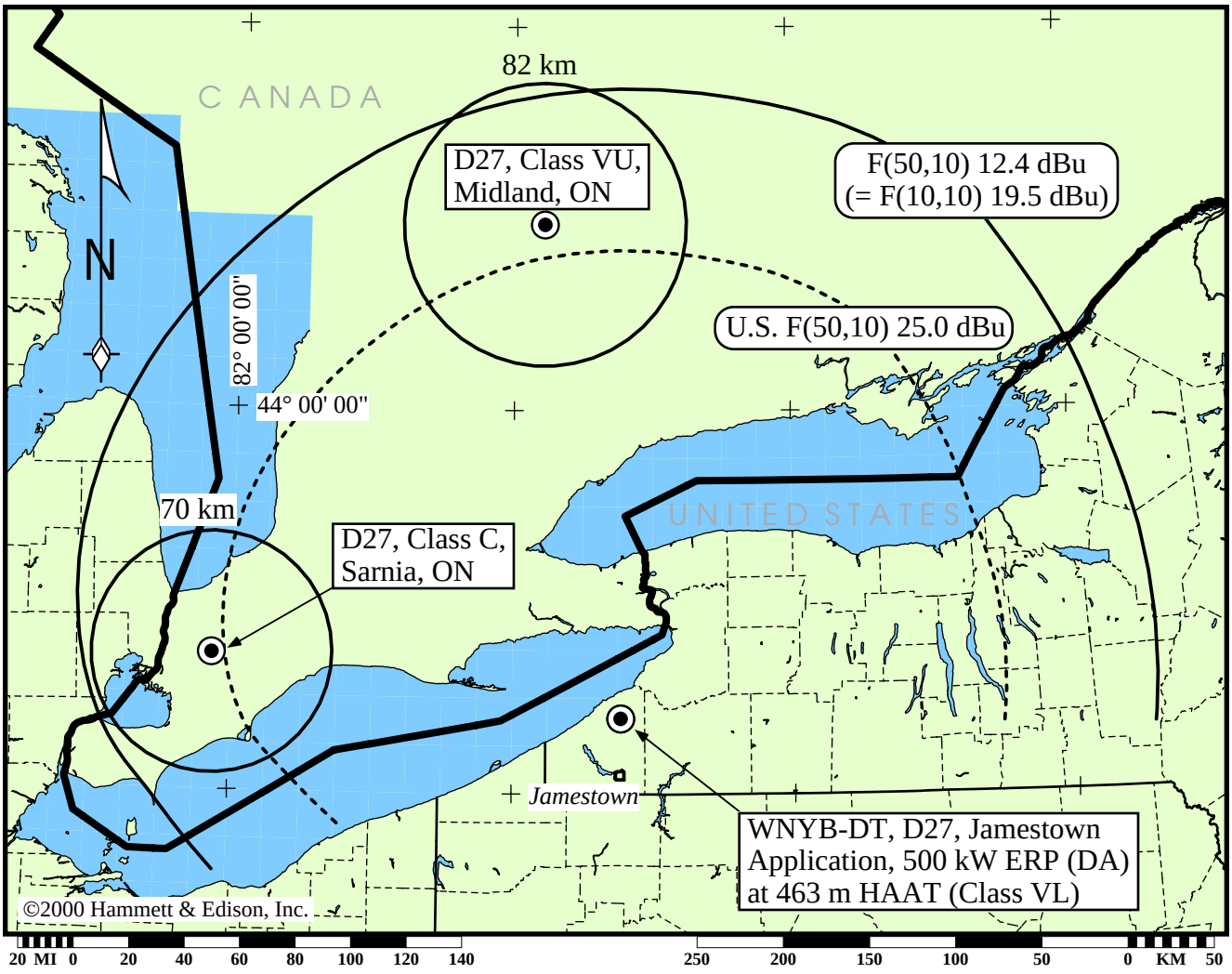
Station KBEH-DT, D50, Bellevue, Washington
Second-Step Contour Test (Application)



Map data taken from Sectional Aeronautical Charts, published by the National Ocean Survey. City limits shown taken from 1995 U.S. Census Bureau TIGER data. Geographic coordinate marks shown at 120-minute increments.

Understanding the September 2000 U.S.-Canadian DTV LOU

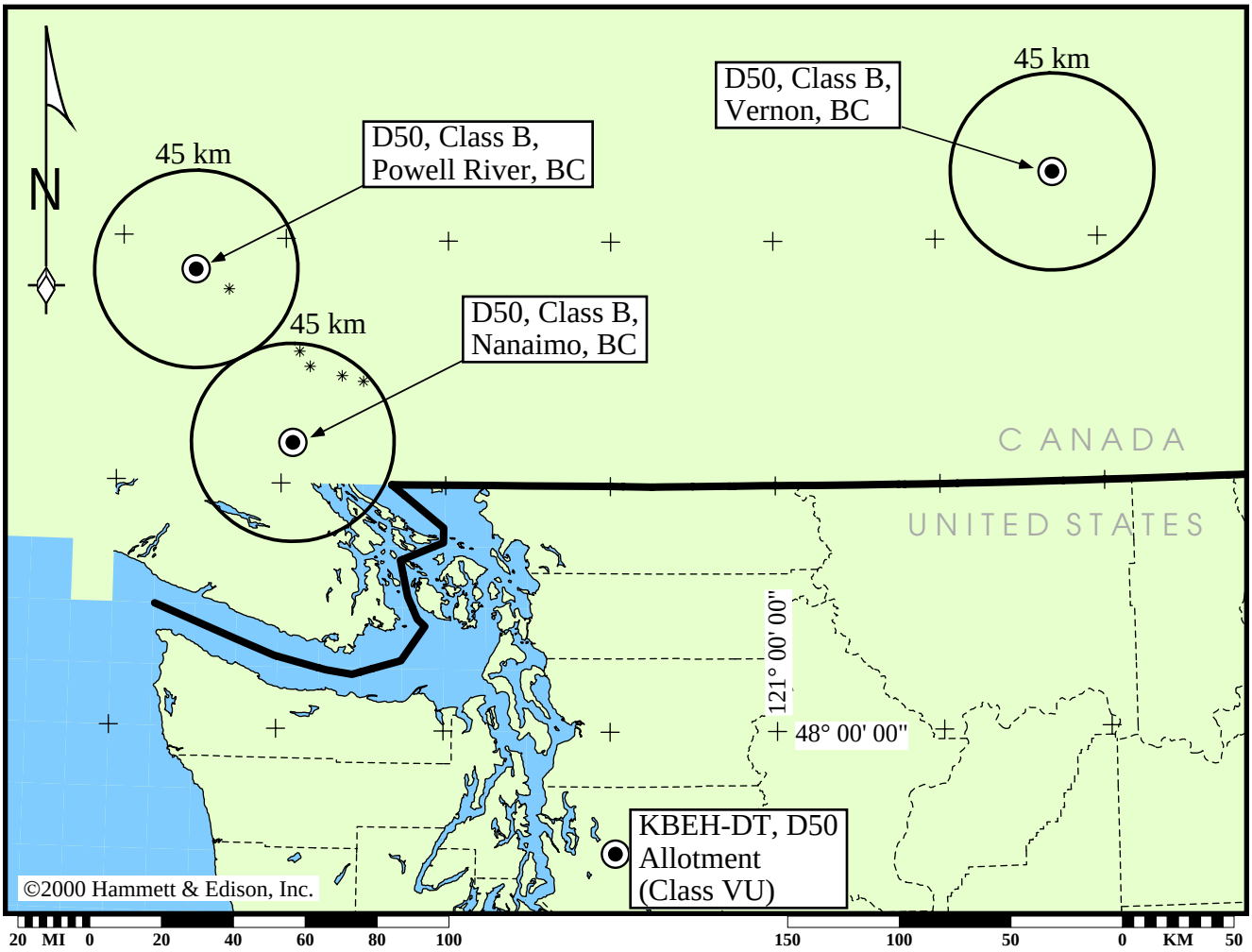
Station WNYB-DT, D27, Jamestown, New York
Second-Step Contour Test (Application)



Map data taken from Sectional Aeronautical Charts, published by the National Ocean Survey. City limits shown taken from 1995 U.S. Census Bureau TIGER data. Geographic coordinate marks shown at 120-minute increments.

Understanding the September 2000 U.S.-Canadian DTV LOU

KBEH-DT, D50, Bellevue, WA (Application)
Third Step OET-69 Style Interference Study
EC3 Ignored



Map data taken from Sectional Aeronautical Charts, published by the National Ocean Survey. Geographic coordinate marks shown at 60-minute increments.

× = No Signal (below threshold)
✳ = Interference (with population in cell)
❋ = Interference (without population in cell)

KBEH-DT, D50, Bellevue, WA (Application)
Third Step OET-69 Style Interference Study
EC3 Ignored

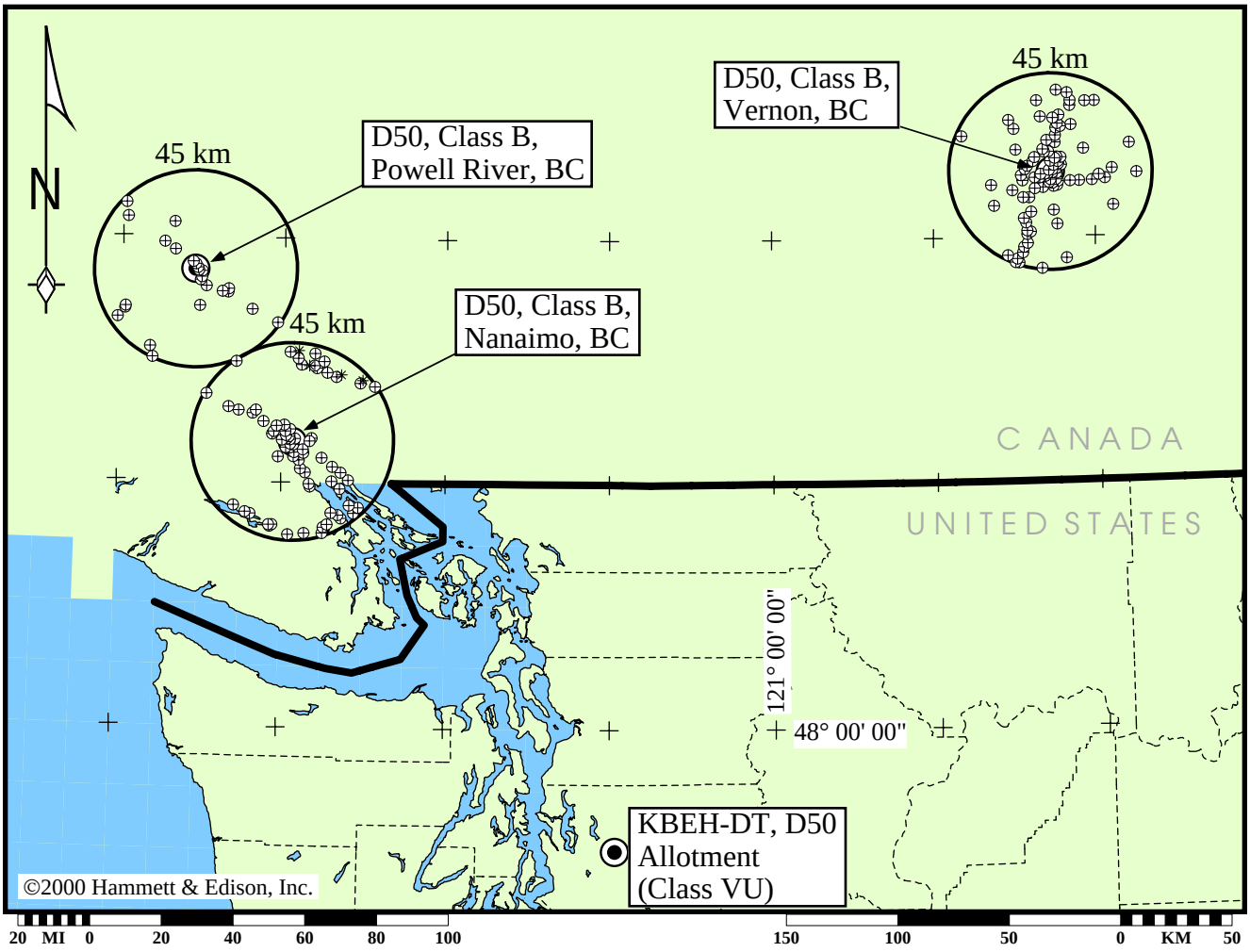
```
Interference analysis
tvixstudy.ca 2.3.5c

Longley-Rice errors ignored (path loss used regardless of error marker)

Before case parameters:
          Station: D50 KBEHDT allot
             City: BELLEVUE, WA
      Coordinates: N  47-30-14.0
                   W 121-58-29.0
      Height AMSL:  965.0 m
      Maximum ERP:  50.0 kW
  Azimuth pattern: DTV1550 (replication)
      Orientation:   0.0
Elevation pattern: OET-69 generic

After case parameters:
          Station: D50 KBEH-DT APP
             City: BELLEVUE, WA
      Coordinates: N  47-30-17.0
                   W 121-58-04.0
      Height AMSL:  952.0 m
      Maximum ERP:   240 kW
  Azimuth pattern: AND-ODDKBEH-DT
      Orientation:   0.0
Elevation pattern: OET-69 generic
```

		Before		After		
	BasePop	IX Change		IX Change		
Protected station	1000s	1000s	%Base	1000s	%Base	%Chng
D50 no_call allot NANAIMO, BC	120	0	0.0	1	0.8	0.8
D50 no_call allot POWELL RIVER, BC	42	0	0.0	0	0.0	0.0
D50 no_call allot VERNON, BC	59	0	0.0	0	0.0	0.0

Note: The results of the OET-69 algorithm are dependent on the use of computer databases, including terrain, population, and FCC engineering records. FCC Rules Section 0.434(e) specifically disclaims the accuracy of its databases, recommending the use of primary data sources (i.e., paper documents), which is not practical for DTV interference analyses. Further, while Hammett & Edison, Inc. endeavors to follow official releases and established precedents on the matter, FCC policy on DTV analysis methods is constantly changing. Thus, the results of OET-69 interference and coverage studies are subject to change and may differ from FCC results.

Understanding the September 2000 U.S.-Canadian DTV LOU

KBEH-DT, D50, Bellevue, WA (Application)
Third Step OET-69 Style Interference Study
EC3 Respected



Map data taken from Sectional Aeronautical Charts, published by the National Ocean Survey. Geographic coordinate marks shown at 60-minute increments.

× = No Signal (below threshold)
∗ = Interference (with population in cell)
❀ = Interference (without population in cell)
⊕ = Longley-Rice error cell

KBEH-DT, D50, Bellevue, WA (Application)
Third Step OET-69 Style Interference Study
EC3 Respected

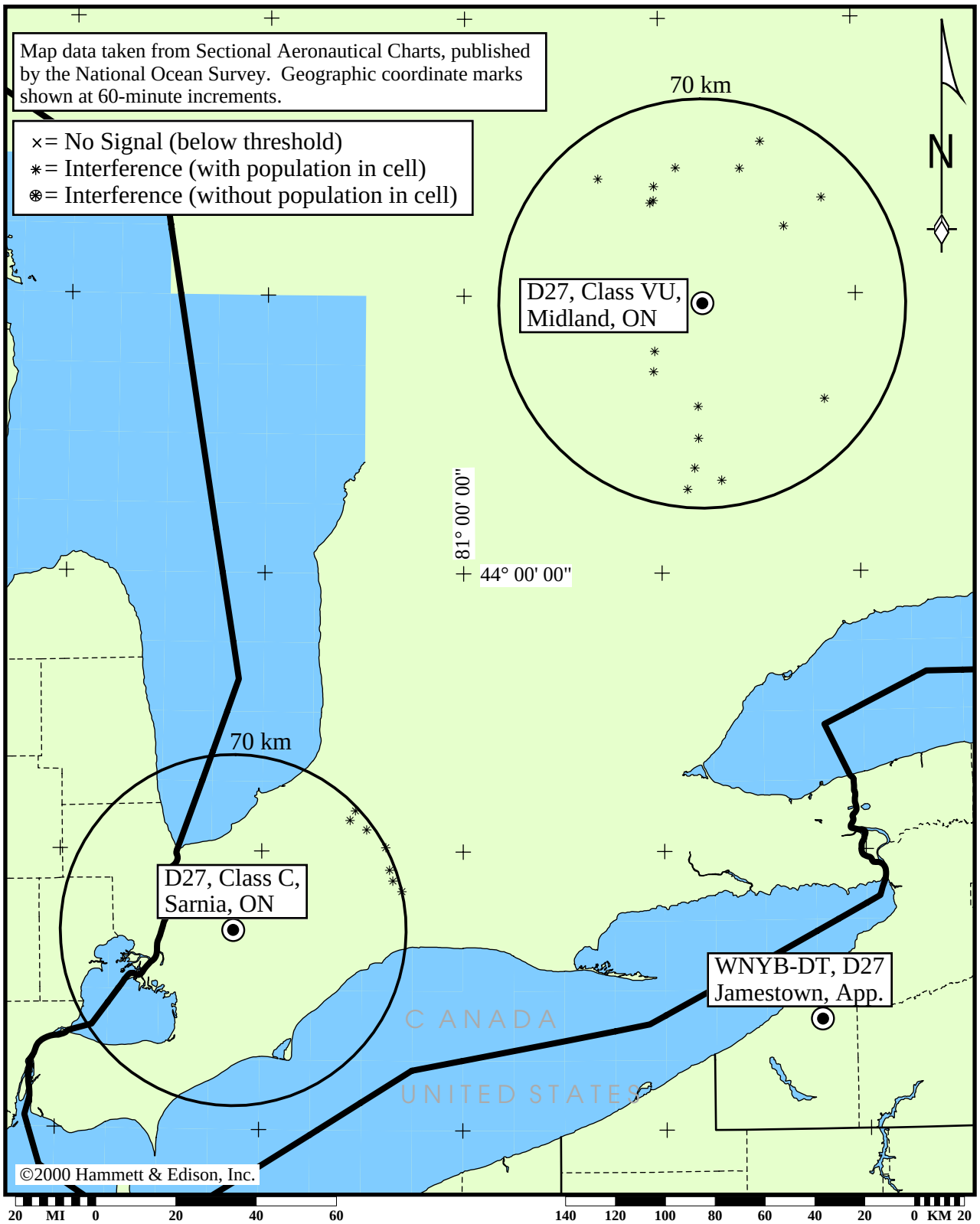
```
Interference analysis
tvixstudy.ca 2.3.5c

Longley-Rice errors honored (error cells have interference-free service)

Before case parameters:
          Station: D50 KBEHDT allot
             City: BELLEVUE, WA
      Coordinates: N  47-30-14.0
                   W 121-58-29.0
      Height AMSL:  965.0 m
      Maximum ERP:  50.0 kW
  Azimuth pattern: DTV1550 (replication)
      Orientation:   0.0
Elevation pattern: OET-69 generic

After case parameters:
          Station: D50 KBEH-DT APP
             City: BELLEVUE, WA
      Coordinates: N  47-30-17.0
                   W 121-58-04.0
      Height AMSL:  952.0 m
      Maximum ERP:   240 kW
  Azimuth pattern: AND-ODDKBEH-DT
      Orientation:   0.0
Elevation pattern: OET-69 generic
```

		Before		After		
	BasePop	IX Change		IX Change		
Protected station	1000s	1000s	%Base	1000s	%Base	%Chng
D50 no_call allot NANAIMO, BC	130	0	0.0	1	0.8	0.8
D50 no_call allot POWELL RIVER, BC	46	0	0.0	0	0.0	0.0
D50 no_call allot VERNON, BC	83	0	0.0	0	0.0	0.0

Note: The results of the OET-69 algorithm are dependent on the use of computer databases, including terrain, population, and FCC engineering records. FCC Rules Section 0.434(e) specifically disclaims the accuracy of its databases, recommending the use of primary data sources (i.e., paper documents), which is not practical for DTV interference analyses. Further, while Hammett & Edison, Inc. endeavors to follow official releases and established precedents on the matter, FCC policy on DTV analysis methods is constantly changing. Thus, the results of OET-69 interference and coverage studies are subject to change and may differ from FCC results.

Understanding the September 2000 U.S.-Canadian DTV LOU

WNYB-DT, D27, Jamestown, NY (Application)
Third Step OET-69 Style Interference Study
EC3 Ignored



WNYB-DT, D27, Jamestown, NY (Application)
Third Step OET-69 Style Interference Study
EC3 Ignored

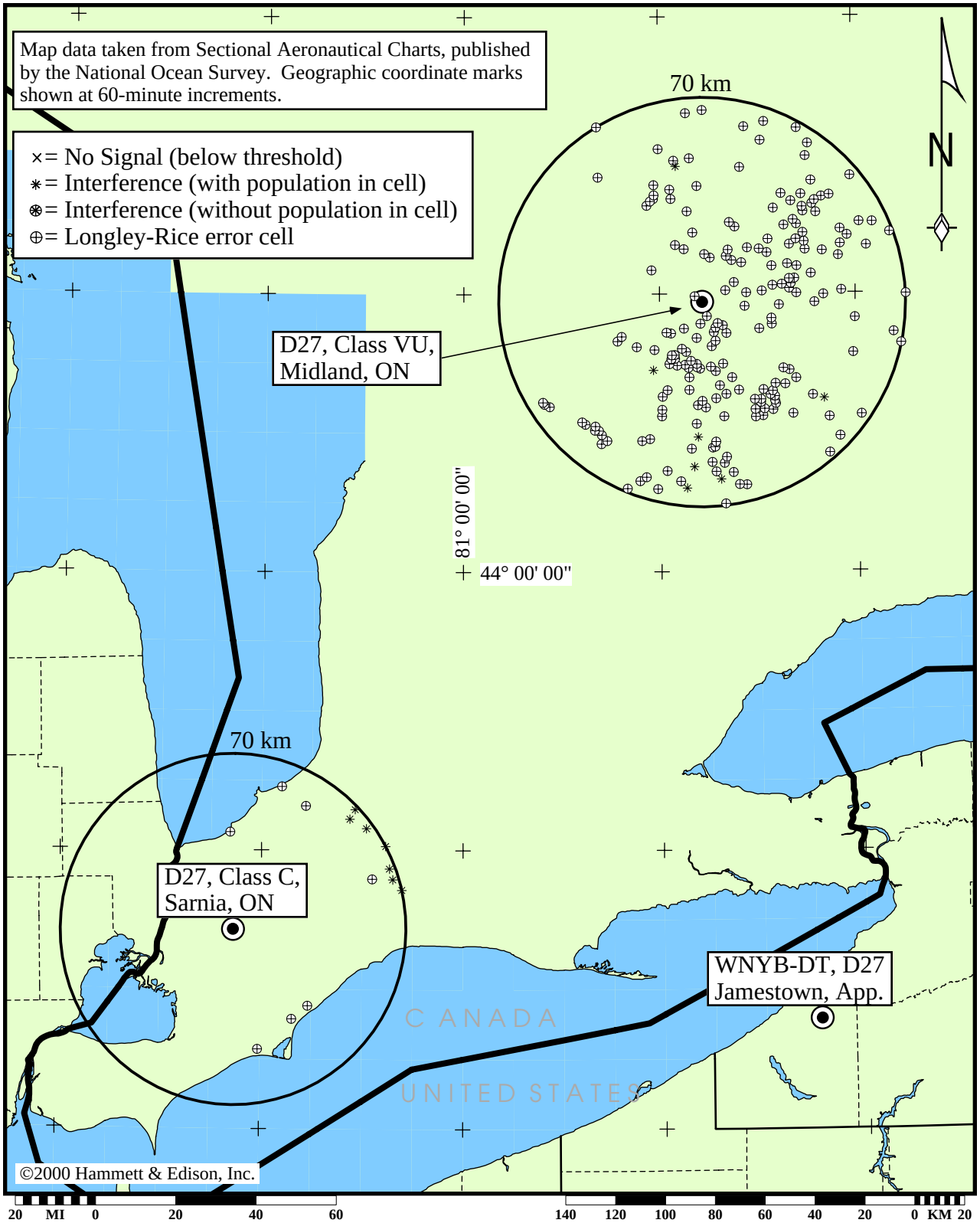
```
Interference analysis
tvixstudy.ca 2.3.5c

Longley-Rice errors ignored (path loss used regardless of error marker)

Before case parameters:
          Station: D27 WNYBDT allot
             City: JAMESTOWN, NY
      Coordinates: N  42-23-36.0
                   W  79-13-44.0
      Height AMSL:  858.0 m
      Maximum ERP:   239 kW
  Azimuth pattern: DTV1075 (replication)
      Orientation:   0.0
Elevation pattern: OET-69 generic

After case parameters:
                   --Modified---------------  --Original---------------
          Station: D27 WNYB-DT APP            D27 WNYB-DT APP
             City: JAMESTOWN, NY              JAMESTOWN, NY
      Coordinates: N  42-23-36.0              N  42-23-36.0
                   W  79-13-44.0              W  79-13-44.0
      Height AMSL:  858.0 m                    858.0 m
      Maximum ERP:   500 kW                    500 kW
  Azimuth pattern: wnybD27.ODDWNYB-DTmodaz.p  AND-ODDWNYB-DT
      Orientation:   0.0                       0.0
Elevation pattern: OET-69 generic             OET-69 generic
```

		Before		After		
	BasePop	IX Change		IX Change		
Protected station	1000s	1000s	%Base	1000s	%Base	%Chng
D27 CIII-TV allot MIDLAND, ON	241	0	0.0	10	4.1	4.1
D27 CKCO-TV allot SARNIA, ON	294	0	0.0	4	1.4	1.4

Note: The results of the OET-69 algorithm are dependent on the use of computer databases, including terrain, population, and FCC engineering records. FCC Rules Section 0.434(e) specifically disclaims the accuracy of its databases, recommending the use of primary data sources (i.e., paper documents), which is not practical for DTV interference analyses. Further, while Hammett & Edison, Inc. endeavors to follow official releases and established precedents on the matter, FCC policy on DTV analysis methods is constantly changing. Thus, the results of OET-69 interference and coverage studies are subject to change and may differ from FCC results.

Understanding the September 2000 U.S.-Canadian DTV LOU

WNYB-DT, D27, Jamestown, NY (Application)
Third Step OET-69 Style Interference Study
EC3 Respected



HAMMETT & EDISON, INC.
CONSULTING ENGINEERS
SAN FRANCISCO

Understanding the September 2000 U.S.-Canadian DTV LOU

WNYB-DT, D27, Jamestown, NY (Application)
Third Step OET-69 Style Interference Study
EC3 Respected

```
Interference analysis
tvixstudy.ca 2.3.5c

Longley-Rice errors honored (error cells have interference-free service)

Before case parameters:
          Station: D27 WNYBDT allot
             City: JAMESTOWN, NY
      Coordinates: N  42-23-36.0
                   W  79-13-44.0
      Height AMSL:  858.0 m
      Maximum ERP:   239 kW
  Azimuth pattern: DTV1075 (replication)
      Orientation:   0.0
Elevation pattern: OET-69 generic

After case parameters:
                   --Modified---------------  --Original---------------
          Station: D27 WNYB-DT APP            D27 WNYB-DT APP
             City: JAMESTOWN, NY              JAMESTOWN, NY
      Coordinates: N  42-23-36.0              N  42-23-36.0
                   W  79-13-44.0              W  79-13-44.0
      Height AMSL:  858.0 m                    858.0 m
      Maximum ERP:   500 kW                    500 kW
  Azimuth pattern: wnybD27.ODDWNYB-DTmodaz.p  AND-ODDWNYB-DT
      Orientation:   0.0                       0.0
Elevation pattern: OET-69 generic             OET-69 generic
```

		Before			After		
	BasePop	IX Change			IX Change		
Protected station	1000s	1000s	%Base		1000s	%Base	%Chng
D27 CIII-TV allot MIDLAND, ON	267	0	0.0		2	0.7	0.7
D27 CKCO-TV allot SARNIA, ON	295	0	0.0		4	1.4	1.4

Note: The results of the OET-69 algorithm are dependent on the use of computer databases, including terrain, population, and FCC engineering records. FCC Rules Section 0.434(e) specifically disclaims the accuracy of its databases, recommending the use of primary data sources (i.e., paper documents), which is not practical for DTV interference analyses. Further, while Hammett & Edison, Inc. endeavors to follow official releases and established precedents on the matter, FCC policy on DTV analysis methods is constantly changing. Thus, the results of OET-69 interference and coverage studies are subject to change and may differ from FCC results.