December 5, 2008

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Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
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Dear Ms. Walli:

Re: BOARD FILE NUMBER: EB-2007-0709, COMMENTS ON DSC AMENDMENTS FOR STRAY VOLTAGE

My comments are provided below for in *italics* for each section of the BOARD FILE NUMBER: EB-2007-0709 Document. My general comments are at the end.

Brief Background on Farm Stray Voltage
One of the main contributing sources of stray voltage on farms is elevated current on the distribution neutral conductor. This current can be transmitted to animal contact locations on the farm through the earth by way of groundings on both the distribution and farm electrical systems, and by way of a common bond -required under Ontario's Electrical Safety Code - between the distribution system and farm system neutral conductors.

1) The NEV on the ground rods produces ground gradients. An animal standing in the gradient would be exposed to a small voltage and current will flow through the body of the animal. This voltage would normally be <50 MV. Stating the problem current is transmitted through the earth is very misleading and gives credence to assertions in Bill 143 that concluded all ground currents are dangerous.

2. ACC/ACV as a 'Quality of Supply' Indicator
- Since ACC/ACV varies from one contact location to the next, the voltage measured between the barn ground and remote earth will provide a single indicator for ACC/ACV throughout the barn (Williston; p. 4).

Therefore, the Board has determined that the distributor's contribution to ACC/ACV be adopted as the indicator of the 'quality of supply' in relation to farm stray voltage.
Comments:
The Board states below that the utility is responsible only for its contribution to the ACV. The question is how to establish this value accurately with a minimum of effort. ACV must be less than NEV in a fault free barn with all the metal in the barn properly bonded to the barn neutral. ACV varies with the location in the barn and contact resistance of the plate used for the second contact point. In a large barn, to be sure that the ACV recorded is the highest level of ACV in the barn, would require literally 10s if not 100s of measurements. In practice, the approach is to ask the customer where he or she has observed a response(s) from the animal. That point and a couple of others are measured and used as the ACV reference level. The NEV is constantly changing due to the primary load constantly changing which will mean the ACV is constantly

changing. To compare readings in the barn at point A to readings at point B, the NEV and the ACV must be simultaneously measured for each point.

It is not practical to record ACV directly because this means leaving long leads and the contact plate in locations where the animals can contact them. The plate can get relocated by the animal or the lead disconnected or damaged. Based on the simultaneous reading of both NEV and ACV, the ratio of the ACV to NEV ratio is calculated and a recorder installed measuring NEV for a period of not less than 72 hours. The ratio is then used to calculate ACV for each NEV reading.

The NEV is taken without a loading resistor while the ACV is taken with a 500 ohm resistor in parallel with the meter to simulate the cow's resistance. Due the variables of contact plate placement and contact resistance between the floor and the plate, getting repeatable results with ACV is not practical without a lot of effort. The contact resistance between the plate and the floor changes due to level of moisture, amount of urine, amount of defecation, amount of debris such as bedding, between the plate and the floor. Repeatable results are a must for effective trouble shooting. Some options are:

1. *Take a number of measurements of ACV at different locations and calculate the resistance by measuring the ACV without the resistor and with the resistor in parallel with the meter. For example, if the voltage drops to 50% when the 500 ohm resistor is added, then the total impedance in the path including the contact resistance must be 500 ohms. Record the resistance value to be used to normalize future readings for comparison purposes.*
2. *Use the remote ground as the second point of contact to measure ACV. This is essentially the NEV measurement with the 500 ohm resistor in parallel with the meter. The resistance of a remote ground probe properly installed and located is always less than the resistance of the sum of concrete floor resistance to remote earth and the contact resistance between the plate and the floor. Therefore, this will provide the maximum level of ACV. This should provide repeatable results and it is necessary to make a measurement at only one location.*
3. *Use NEV instead of ACV as the limit. If the 0.5 V NEV is met, then this will provide plenty of margin for ACV which typically runs at 40%-60% of NEV. Since the proposed approach is as per the US where one instantaneous measurement is taken, the margin could be justified. With a mitigation device such as a VTNI or Hammond Filter, this can be readily achieved.*
4. *Record NEV. Use the ACC/NEV ratio to calculate ACV.*

If the barn is not properly bonded and one or more secondary ground faults exist, then the ACV measurement can be very misleading. For example, assume an un-bonded electric motor had a ground fault that resulted in high ACV at the motor. Then the ACV reading at other bonded locations within the barn would not be representative of the ACV at the faulty motor. In addition, unless that motor was running at the time of the test, the high ACV would not appear at the motor. The solution is to perform the bonding test and the insulation test to uncover these problems before concluding that everything is satisfactory because the ACV reading at the one location recorded is less than the maximum acceptable level.

3. A Proposed ACC/ACV Distributor Contribution Threshold.

The information presented in that report suggested that, including where jurisdictions adopted regulatory measures that include a 1 mA ACC/0.5 V ACV distribution system contribution threshold, rate impacts have been negligible.24

Comment:

I doubt that the rate impacts would be negligible to the customers if the costs were absorbed by the farm customers only. There is no rationale presented to support the argument that all customers be expected to absorb this cost. The directive to the OEB from the government states that this is a farm problem. See below.

> *"The Board shall implement such measures which, in its own*

discretion, having regard to the objective related to quality of electricity service provided for in paragraph 1(1)1 of the Act, are necessary to ensure electricity service to farm customers, in relation to "tingle" or "stray" voltage, is of a quality that does not unduly impact the operation of the farm."

The proposed amendments do not address the stray voltage issue for households, supposedly because the Board was not directed to do so. Complaints from households are far less frequent, probably in the range of 1%-5% of total complaints. One would assume that the LDC will absorb the cost of a mitigation device for households.

4. ACC/ACV Investigations.

In consideration of the above, the Board will prescribe an investigation procedure that permits the accurate determination of the contribution from the distribution system to total measured ACC/ACV at animal contact locations

Comment:

Does this mean only that one test will be prescribed? As I indicated in my comments on the DP, the Board or anyone else outside LDC is not in a position to develop procedures for the LDC for a number of reasons. The Board presumably would develop a generic procedure which would not recognize unique situations and requirements within the LDC. Using Hydro One as an example::

- *The organization dictates to a large extent the process and to a lesser degree the procedure. The Hydro One process and procedures makes use of field staff MDETs who are trained and capable of performing tests but not necessarily capable of interpreting results. This is left to engineers suitably trained, the Distribution Planners. A generic procedure would be written as if one person had the responsibility and capability of doing all the tests. Procedures must be written at the level of the worker using the procedure. The procedure for the MDETs is more explicit than the procedure for the Distribution Planners. The Hydro One organization requires the involvement of the Call Centre, the Field Business Centre, the Work Centre etc. The process and procedure must specify which group does what and when in an organization such as Hydro's..*
- *Staff is trained on the use of specific instruments. The CANDURA recording voltmeter is an example of this. Hydro One has safety requirements for test equipment that must be adhered to and Hydro One uses specialized and often costly test equipment for stray voltage which is cost effective because the instrument is also used for other functions. Hydro One procedures must specify exactly which instrument to use, CAT IDs etc.*

The Board should review and approve all utility procedures to ensure they meet some minimum requirement but not dictate the procedure. The minimum requirement can be defined in a generic manner. For example, the technique for establishing the maximum level of ACV needs to be standardized generically. The Hydro One procedure uses the customer's load, the US approach uses an external load. There must be a meeting of minds on items such as this.

5. Distributor Obligations to Ensure Investigators are Qualified.

The Board also proposes to amend the Code to ensure that these individuals, preferably as demonstrated by documentation attesting to either relevant training or equivalent experience in lieu of training, are familiar with the investigation and remediation of distributor contributions to ACC/ACV.57

Comment:

There are trained people in Hydro One. Hydro One could assist other utilities. Training courses for other interested parties can be readily developed if there is sufficient demand. A problem will continue to exist for electrical contractors. To date, the cost of the training and the test equipment makes stray voltage investigation unviable from a business perspective.

6. Distributor Responses to Farm Stray Voltage Requests

Comment:

The existing Hydro One process and procedures appear to meet the Board's requirements.

7. Distributor Reporting Requirements
Comment:
This should not be a big issue based on what the existing process calls for.

8. Providing Information to Livestock Farm Customers
Comment:
A billing stuffer was used effectively in the 1980s.

9 A. Distributor Discretion in Resolving Distribution System ACC/ACV Contributions
Given that each case of farm stray voltage can have unique characteristics, that consideration must be given to the condition and operation of a distribution circuit when making decisions on how to address a given case, and that safety-related codes and practices must also be considered, the Board believes that distributors should have discretion as to, and be accountable for, choosing the most appropriate and cost effective way to resolve farm stray voltage problems.
Comment:
This allows the LDC to install a mitigating device on all farms if it chooses to do so. This is appropriate providing the LDC makes appropriate measurements to verify that the NEV is within acceptable limits. The Board should not dictate the process by which this achieved but provide direction as to what constitutes sufficient proof that the NEV is being maintained within acceptable limits. The Canadian utilities have been using 10 V as the limit for decades. This limit has proven to be acceptable for the vast majority of customers. The Board should clarify that the 10 V NEV limit remains the design and operating standard. This is currently the limit in the Ontario Electrical Safety Code. Livestock operators are a group with special needs. Reducing the NEV exposure to this group of customers, or any other customer, by implementing a site specific form of mitigation is the only economically viable method of meeting this need.

9 B. Distributor Discretion in Resolving Distribution System ACC/ACV Contributions
It is also the Board's view that responsibility in relation to farm stray voltage that arises from sources other than a distribution system should remain with the livestock farm customer.
Comment:
I agree with the rationale provided by the Board for this position. However, unless some incentives are provided to electrical contractors, they are not going to invest the time and effort to get trained and equipped to do tests on their own. The customer will not be well served if the utility stops assisting in the troubleshooting. The Hydro One approach is to insist that the customer have his or her contractor on site at the same time as Hydro One MDETs and Lines are on site. The contractor gets some training and if defects are found, they can be corrected immediately. Based on my discussions with field staff, this appears to work well. One possibility is for the LDC to charge for this service.

9 C. Training Standards and Certification

The Board is of the view that a determination on the merits of creating obligations regarding training standards and certification requirements must await the emergence in Ontario of formal farm stray voltage training programs and related certifications.107
Comment:
The Hydro One training should meet or exceed the Board's requirements for formal training. This could be offered to others by Hydro One or an outside company using the Hydro One facilities.

Anticipated Costs and Benefits of the Proposed Amendments
The Board believes that the incremental costs accruing to distributors from implementing the proposed Amendments will be offset by the benefits associated with enhanced assurance that distributor responses to farm stray voltage requests are efficient, consistent and effective.
Comment:

The LDCs need to estimate the cost, both financially and human resource wise, to respond to this new reality. It is fair to assume that any farmer who does not have mitigation device installed will now want to have one installed as an insurance measure since there is no financial obligation on the farmer's part for making the request. Possibly the Dairy Framers of Ontario could assist in determining how many farmers already have mitigation devices including equipotential grids, Hammond Filters, Ronk Blockers and VTNIs. Once these numbers are known, then some estimating can be done. If there are only 100 farms that do not have mitigation devices then using the reactive approach and installing a VTNI should be workable. However, if it is several thousand then the reactive approach would overwhelm the LDC staff and other options would need to be developed.

General Comments

The Board appears to have recognized that demanding the ACV level of 0.5 V can not be economically achieved by improvements to the distribution system which is significant improvement over the views expressed in the DP which appeared to suggest following the Wisconsin model completely. I disagree with the policy of transferring the financial obligations to the whole customer base. It should be borne by the farm customers who are the only customer class who benefit. I do not agree that the costs will be insignificant. If 5,000 farms require mitigation at a cost of $3,000 this is $15M which is not insignificant. To supply the device, perform the appropriate testing, troubleshooting, installation, and post installation testing, for a device such as the Dairyland VTNI can easily cost $3.000 or more.

The involvement of the Board in the regulation of stray voltage came about as a result of Bill 143, the bill that suggested the elimination of all ground currents was required for health reasons. This sentiment was expressed at the December 2007 Workshop on stray voltage and by some respondents to the DP. The Board has not explicitly addressed this issue. Until the Board does so, I believe this will still be an issue that plagues the LDCs who are not equipped to respond to this assertion effectively.

Another issue discussed at the December Workshop was farms with unique problems. The livestock on these farms exhibit some of the symptoms of stray voltage but electrical measurements do not indicate a stray voltage problem. In my comments to the DP, I recommended a special Task Force be formed to address this problem. I would appreciate a response from the Board on this recommendation.

Thank you.

Best regards,

Original signed by,

Dale Williston
President