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October 2, 2012

Ms. Luly Massaro, Clerk
Rhode Island Public Utilities Commission
89 Jefferson Boulevard
Warwick, RI 02888

In Re: Commission Investigation Relating to Stray and Contact Voltage Occurring in Narragansett Electric Company Territories Docket 4237

Dear Ms. Massaro:

As you know, I represent Capital Advocacy, LLC d/b/a Contact Voltage Information Center ("CVIC") in the above captioned docket. My client is in receipt of National Grid's response to Hearing Record Request 4 and has the following comments.

CVIC expected National Grid's response to address two issues related to the threshold voltage level for corrective measures. First, CVIC expected National Grid to clarify its existing Electric Operating Procedures ("EOP"), which contains "awkward wording", according to its own witness. Second, CVIC expected National Grid to incorporate additional testing to identify contact voltage below the proposed 4.5 volt threshold in its Proposed Rhode Island Electric Contact Voltage Program ("Proposed CVP").

According to National Grid's response to Hearing Record Request 4, it will not revise its EOP. Thus, the "awkward wording" will remain. In addition, while National Grid did propose additional testing methods, its proposal is incomplete.

During the hearing, the Commission heard extensive testimony regarding the voltage level at which National Grid must take corrective measures. National Grid's existing EOP requires corrective measures if "elevated voltage found is greater than 1 volt" in the State of New

York.[1] CVIC suggests that National Grid's Proposed CVP incorporate this same standard. National Grid disagrees. Rather, it proposes a 4.5 volt threshold for corrective measures in Rhode Island.

National Grid's witnesses testified that although it proposes a 4.5 volt threshold for corrective measures in Rhode Island, its existing EOP *does* require corrective measures in certain situations below this threshold. However, National Grid acknowledged that its current EOP contains "awkward wording" on this subject.

> "MS. WILSON-FRIAS: At the end of the day -- I have two questions. First, to clarify from the company's witnesses in the mobile testing areas where voltage is greater -- if one volt or greater is going to be found, what are you going to do as a practical matter if you find contact voltage at less than four-and-a-half volts?
>
> MS. GRIMSLEY: Can we have moment to confer?"[2]
>
> ******
>
> "MS. GRIMSLEY: Earlier when I was referring to -- I think both Mr. Cass and I were talking about when a problem is discovered that's less than four-and-a-half volts, what do we do, and in our existing EOP it says -- and this is under the New England section, "If the voltage measures less than 4.5 volts and is found to be consistent with system operation design," and then in parentheses, "no visual evidence of a problem upon review," no further action is required." And while it doesn't explicitly state it here, one, I think you can infer from this that if there is visual evidence of a problem upon review for voltage measures less than 4.5 volts, that action is required. So it's a little awkward wording in the EOP, but this is our current practice and we're not proposing that we change that. So I don't know if Mr. Cass has anything to add to what I've said."
>
> MR. CASS: No.
>
> MS. WILSON-FRIAS: If the inverse is true, then what is the action that is required between one volt and four-and-a-half volts if visual inspection -- to use all kinds of double negatives -- is not found to be consistent system operation design? That is not addressed in here. While there may be inverses and opposites and so forth, it doesn't say what the company's going to do, it has no instructions to your field personnel as to what they're supposed to do between one volt and four-and-a-half volts if it is not found consistent system operation design. That's where the concern is and I think that's probably where all the arguments have come from.

[1] National Grid, Electric Operating Procedure General, Equipment Elevated Voltage Testing, Doc. # NG-EOP Go16, page 11.
[2] Hearing Transcript, September 24, 2012, p. 224

> MS. GRIMSLEY: As I believe we talked about earlier, but I'm not positive how much of this detail came out, when they're doing the mobile testing, the actual voltage, they're getting a hit that the actual voltage level is not shown, you have to actually get out and do the testing. Correct? So then when we do that, that would mean using the manual equipment to find that test. The company can revise our procedures to clarify what would be done, and our intent would be to repair -- if there was visual evidence of the problem upon review, to make a repair in that situation.
>
> THE CHAIRMAN: I'd like to see that statement reduced to an operating procedure that will be -- tell the National Grid employees what they're supposed to do under these circumstances and not just well, the intent is this. And then if -- when we get that fairly rapidly from you, get the other parties to weigh in what they think of it, whether they think it's appropriate or not. I mean, we have a thing hanging here. We need some help."[3]

However, National Grid's response to Hearing Record Request 4 indicates "At this time, the Company does not believe that amending its existing EOP for voltage readings between 1 volt and 4.5 volts is appropriate." Thus, National Grid does *not* propose to clarify the "awkward wording" of its current EOP. CVIC objects to this, and requests that National Grid clarify its existing EOP to conform to the September 24, 2012 hearing testimony provided by its witnesses.

National Grid also agreed to add a further testing component to the proposed CVP for voltage readings between 1 and 4.5 volts:

> "MS. GRIMSLEY: Just to further clarify what I said before, I think the intent was -- my intent right now, I'm not used to writing procedures this quickly because you're right, we'd have to be sure it was clear, but Mr. Cass indicates we could add a component of doing a further test to determine is it contact voltage or is it stray voltage and following up on those that are contact voltage."[4]

National Grid's response to Hearing Record Request 4 outlines the "further test" to determine contact voltage. National Grid proposes to use testing for total harmonic distortion ("THD") to determine "appropriate mitigation for elevated voltages." National Grid correctly states that "According to the IEEE Working Group draft, THD represents a possible method to determine whether an elevated voltage is contact voltage or stray voltage." Thus, National Grid proposes to use THD testing to determine whether remediation is necessary for voltage readings between 1 and 4.5 volts. Although CVIC generally agrees with this proposal, National Grid's proposed testing and remediation procedure is incomplete.

While National Grid relies on the IEEE Draft Standard On Contact Voltage to validate its use of THD testing, it ignores the IEEE's testing and remediation procedures. According to the

[3] Hearing Transcript, September 24, 2012, p. 227-230
[4] Hearing Transcript, September 24, 2012, p. 230

IEEE, "once a voltage is detected, it must be verified and measured."[5] "Voltage measurement alone cannot distinguish a fault condition from NEV, but harmonic analysis of the voltage can reveal its source, guide repair efforts, and help determine the possible hazard level."[6] According to National Grid, THD readings greater than 10% are usually not considered contact voltage. Thus, Grid will not remediate the situation unless it finds "visual defects." This proposal is unacceptable.

First and foremost, National Grid's proposal is inconsistent with the IEEE's suggested mitigation process. The IEEE Draft Standard On Contact Voltage identifies mitigation steps where THD readings are below 5% *and* above 10%. The IEEE fully explains these steps, provides an illustrated flow chart, and is clear that a utility should "Perform all steps" in mitigating these issues. [7] (*See* attached) Yet, National Grid completely ignores the mitigation steps for THD exceeding 10%.

Rather, National Grid relies on the discovery of "visual defects" to determine whether mitigation is necessary where THD exceeds 10%. This proposal makes no sense and contradicts the purpose of the statute. As R.I.G.L. §39-2-25 states, "Contact voltage is of greatest concern in areas where *underground* electric distribution systems exit, as faults on those systems may remain active for long periods of time *before detection* and repair, and therefore contact voltage is a potential shock hazard." (emphasis added) The purpose of the statute is to discover issues that primarily exist underground and may escape visual detection. If the causes of contact voltage could be visually detected, there would be no need for the manual and mobile detection equipment National Grid proposes to incorporate in its Proposed CVP.

Thus, if National Grid proposes to use THD testing, CVIC requests that it be ordered to follow the remediation procedures identified in IEEE Draft Standard On Contact Voltage.

Sincerely,

Joseph A. Keough Jr.

JAK/kf
Enclosures
cc: Service List (via electronic mail)

[5] Exhibit 2, IEEE Draft Standard On Contact Voltage, Section 6.5, page 5
[6] Exhibit 2, IEEE Draft Standard On Contact Voltage, Section 6.5, page 9
[7] Exhibit 2, IEEE Draft Standard On Contact Voltage, Section 6.6, page 11-12

6.6 Sample Mitigation Steps

These sample steps are designed for a 2-wire lighting circuit. Other scenarios may require more steps to perform harmonic analysis, determine the energy source, and assess whether voltage is due to a fault or normal condition.

<5% Harmonic (Phase conductor source)

1. Test the "hot" and neutral wires for reversed polarity.

2. Open any disconnecting means, e.g. fuse, meter, main switch, etc. If the elevated voltage condition goes away, the fault is downstream of the fuse, switch, etc. Check connections and accessible parts of the streetlight for damage if the source is a phase fault.

3. Survey the area for additional sources of power, such as overhead cables from a streetlight or underground building service cables running adjacent or under the site. De-energize those one at a time to see if they are the cause.

4. If the elevated voltage condition remains on the streetlight with the fuse and any other sources disconnected, the fault is in the underground service conductor or its main feeder. Check for voltage on the service conduit, hand hole, sidewalk, or roadway. Disconnect the service at the feed structure. If voltage remains, disconnect other supply conductors which are routed near the energized surface. This may be a faulty service to a nearby kiosk, building, etc or a fault in the secondary feeder running past/under the site. Hot, dry patches of sidewalk or soil may be present, even in wet weather. This is a hazardous condition and should not be left unattended until voltage is mitigated.

>10% harmonic (neutral conductor source)

1. Open any disconnecting means (see step 2 in phase conductor procedure.)

2. If voltage goes away with disconnecting means opened, check for neutral faults in the utility supply circuit by performing a load test with dummy load, typically 1000W or more. If voltage drop is >5%, check neutral connections or cable for possible repair or replacement. Start at the feed structure and work back towards the supply transformer. If the voltage drop under load is <5%, check for faulty neutral conductors or connections on the load side of the disconnect.

3. If voltage does not go away, source could be NEV or a neutral failure in another nearby building or street furniture. There may be electrical complaints or malfunctions that help identify a degraded neutral. "Net current" will also be present. That is, an ammeter placed around all supply and neutral conductors should measure zero amps, but Check neighbouring buildings or street furniture by de-energizing them one at a time. If the load test passes and voltage is low, <10V, the source is likely NEV.

4. To confirm NEV, measure for voltage on utility system neutral wire, compared with validated ground references. NEV will be measureable as a small, steady voltage with high harmonic distortion between the neutral and local ground references, even with no loads attached. NEV mitigation is covered in section 7 of the Guide. An engineering analysis will be required to determine the best course of action, which may be to do nothing.

NOTE: Between 5-10% 3HD, source is likely a phase conductor, but could also be a neutral problem or NEV. Perform all steps.

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