Stray and Contact Voltage Working Group
Matthew Norwalk, Chair
Chuck DeNardo, Vice Chair
Scott Kruse, Secretary

2018 IEEE PES General Meeting
Double Tree by Hilton Hotel Portland
Portland, OR

August 6, 2018
1PM – 4PM

Approved Meeting Minutes

Attendees

John Ainscough - Xcel Energy
Bryan Beske – American Transmission Co.
Anthony Cedrone – Con Edison of NY
Chuck DeNardo – Consultant
Alexander Dornhelm – Con Edison
Kevin Grant – Con Edison
Stuart Hanebuth – Power Survey Co.
David Kalokitis – Power Survey Co.
Scott Kruse – Power Survey Co.
James Leary – Con Edison of NY
Sal Martino – Duke Energy
Robert Naphen – National Grid
Matt Norwalk – SCE
Pablo Torres – PG&E
Mark Voigtsberger - UTGIS
Fred Frederick – Vectren

The Stray and Contact Voltage Working Group met at the 2018 IEEE PES General Meeting on Monday afternoon August 6th at the Double Tree by Hilton Hotel in Portland, OR. There were 16 people in attendance.

The meeting began with a review of the obligatory slides and then the meeting agenda.

Following the agenda, the group reviewed the minutes from the Jacksonville meeting. The minutes were approved with a motion from Anthony Cedrone that was seconded by David Kalokitis.

At the Jacksonville meeting the group discussed that the working group was only being recognized as a study group until a new PAR gets submitted and approved. That process took place prior to this meeting and a new PAR has been approved for a 4yr term. Since this was the first meeting of the working group everyone in attendance, that requested membership, became a voting member. 14 of the 16 people who attended requested membership. Additionally, the Chair appointed new officers; Chuck DeNardo for Vice Chair and Scott Kruse for Secretary.

The Chair announced that the policies and procedures for the working group will be replaced by those of the distribution subcommittee. He also took a few minutes to recognize the officers of the previous working group, which published the Guide. Plaques were presented to the officers Chuck DeNardo (Chair), Jim Bouford (Vice Chair) and Scott Kruse (Secretary). Jim was not present at the meeting so his will be mailed.

Mark Voigtsburger from UTGIS presented: A Closer Look at Contact Voltage Confirmation Procedures. UTGIS suggests the fundamental process of confirming contact voltage is flawed and cannot be consistently replicated. He thinks some of the procedures in IEEE 1695 are flawed, one thing in particular is using long test leads. Mark emphasized all data presented is publicly available except one case study. He presented 3 case studies, results from field testing, 3 real world examples, supporting information from The Green Book (IEEE 142), and recommended changes to IEEE 1695. Mark's case studies pointed out that data showed discrepancies in the number of objects with contact voltage that got reported and the number of objects the Electric Utility or another contractor confirmed. His results showed differences of 52.8% to 84.4% between number of objects confirmed. Questions regarding the data came up; where was the data from and was it stated that the objects were contact voltages? Mark stated that it was from utility websites, specifically; New York, Maryland and Rhode Island. It was also not stated weather they were contact voltages, so he agreed they should just be called objects with voltage. Members of the group familiar with the data sets, interjected that some of the values he presented might not be correct. Also, when using public data, it's important to read the disclaimers. Mark felt there still shouldn't be discrepancies between findings. He also attributed it to confusion as to what ground was used in the measurements of the reported objects. Yet it was pointed out the data sets do include that information. Mark went on to present a few charts as a review of the public Data. One was a bar chart of the number of identified objects by voltage ranges from 1-4.4V, 4.5-24.9V, and 25 and greater, vs year from 2009 to 2017. The other was a line chart of failures per hour for each voltage range over the years 2009 to 2017, but he wasn't sure what types of failures they were because he didn't have that information. The last chart was a control chart of the data showing all the total number of objects for each year plotted with a mean control line, upper control line and lower control line. Mark concluded the rate of detection appeared to be going up. He went on to discuss a field test he did with a 100' run with ground rods every 10'. He took readings with a Fluke 177 digital voltmeter with a 500ohm shunt and a Simpson 260 analog voltmeter without a shunt. At 100' the 177 read 1.2V and the Simpson 0V. The voltage on the fluke increased about 120mV every 10'. Mark stated the fluke was reading erroneous voltage which he referenced to Zero Input behavior. He went on to say field technicians are not engineers and the procedures in the guide are not geared towards them. He presented another field test where he made a voltage measurement on three lengths of wire 25', 50', and 100'. The wires were not connected to or

influenced by any voltage source. However, he measured 1V or greater with a fluke 177 and a 500ohm shunt, but 0V with a Simpson 260 without a shunt. Members of the group did not believe these results. It was revealed that the meter was on the 1000V scale where it would have caused the meter to read erroneously. This was shown in a photo he presented with the meter connected to a carriage bolt used as a ground rod. He said he took readings on all the scales and the voltages varied, but he did not record them. Mark continued his presentation with actual examples of objects with voltage on them that were reported by one contractor but not able to be verified by another. He had two examples of street lights that showed measured electric field during the day when the lights were off, which he attributed to the lay of the phase conductor inside the pole. It was not clear if the contractor took the measurements during the day, but it was pointed out that the guide would tell you to check them at night. Mark then said they were tested at night. His final example was of a traffic control box that was reported having 10.2V, but the utility measured 1.2V. Someone pointed out that the values could have been miss-keyed when recorded. It was asked what references were used and if they were open circuit or shunt voltages? Mark didn't have that data. Mark then showed an image that demonstrated Section 4.1.2 of IEEE 142- The Green book (2007). The image showed the voltage gradient from a ground rod which was the lowest impedance fault current path from a 2-wire circuit in a pole with a 120V line to case fault. There was a chart that accompanied the image that showed the distance from the pole or energized structure, the % resistance relative to the last gradient shell and the measured potential @120 applied phase voltage. Mark felt this demonstrated that a qualified reference and long test leads were not supported by IEEE 142's Recommended Practice for Grounding of Industrial and Commercial Power Systems. Mark's recommended changes to 1695 where to use a calibrated high quality analog volt/multimeter without a shunt rather than a digital meter to eliminate error from excessive test lead length and use as short a test lead as possible provided it gets outside the gradient. He was asked why the analog meter could not use a shunt. Mark stated it was not possible to use a shunt with the 260 because it already had an internal shunt. The group did not agree. Additionally, someone pointed out that in stray voltage investigations ground rods will be run 200ft out from a source and he never saw an issue with the readings on a digital voltmeter. Mark was willing to demonstrate his tests in person or on a video. It was determined that Mark should turn over the data to the group, so it could be evaluated to see if it was being analyzed incorrectly. It was also expressed that someone should look at the meters and determine if an analog meter is the solution.

The group took a break from 2:32PM to 2:45PM.

The meeting resumed with a review of the revised Table of Contents. The Chair asked if there was an update from UK Power Networks on power losses, but nothing has been released. The other topic questioned was data on horses? Chuck DeNardo said he would see what he could find and provide it to Rob Naphen. Rob also will continue to

do more research. It was emphasized that pools and confined livestock need the most work, and there is need for more content on marina's and boat docks. The Table of Contents will get recirculated to the group for further comments.

The discussion led into a review of the section leads. The Chair asked if anyone wanted to make any changes to the assignment, but no changes were made. He also wants to have a conference call between this meeting and next. There was discussion around getting the content of the guide in the new format. Sal Martino volunteered to attempt the format change. The expectation is to get a rough draft of the guide by the summer meeting next year.

Next the group discussed the term to describe voltage on an object prior to being classified as Stray or Contact. At a previous meeting a list of terms was generated, and Exception Voltage was selected. However, the group decided to go with Investigation Voltage, and defined it as a voltage from an unknown source that requires investigation. It was also suggested Exposure Voltage should be used to define the voltage between two points that may be contacted at the same time. The group agreed Exposure Voltage should get added to the definitions in the guide.

Anthony Cedrone led a discussion on case studies. He only received one response from the last meeting and the goal was to get a diversified set of case studies and feedback on the format. It was suggested to add case studies to the website instead of the guide. The question was posed whether any guides have case studies in them, but no one knew of any off hand. Instead of putting case studies in the guide the solution might be to take a few good examples and hypothesize the outcomes. The Chair will send the template out to the mailing list with some directions and look into having a public facing content section on iMeet.

The meeting continued with a discussion of new business and it was suggested the group invite Marty Page to come and present his pool data. The Chair wants to do a web meeting in late October and will see if he can get Marty and Dough Dorr to attend. He will also propose a 2-hour, four-person panel session for the General Meeting in Georgia.

Motion to adjourn by Anthony Cedrone, seconded by Rob Naphen. Meeting adjourned at 3.54PM.

The next meeting will be at the 2019 IEEE PES Joint Technical Committee Meeting, January 13-17, 2019 in Orange County, CA