

**VELCO Operating Committee (OC)  
FINAL MINUTES**

August 15, 2013, 11 a.m. – 3 p.m.  
GMP Montpelier Office

**Participating members:** Ellen Burt by phone (Stowe Electric Department), Ken Couture (Green Mountain Power), Ken Mason (Vermont Public Power Supply Authority), Ken Nolan (Burlington Electric Department), Bill Powell by phone (Washington Electric Cooperative), Paul Renaud (VELCO), Kevin Perry by phone (VEC), Jeff Wright (VEC), Chris Dutton (VELCO).

**Other participants:** Carrie Black (NASA), Jeff Disorda (VELCO), Dave Haas (VELCO), Kerrick Johnson (VELCO), Dan Nelson (VELCO), Thad Omand by phone (VELCO), Antti Pulkkinen (NASA), Allen Stamp (VELCO), Greg White (GMP)

**Next meeting is a joint meeting  
with the CFO Forum**

September 16, 2013  
11 a.m. – 3 p.m.

VELCO Rutland

**Meeting opening**

- Mr. Renaud opened the Operating Committee (OC) meeting at approximately 11:00 am. Mr. Renaud stated he knew of one additional agenda item from Mr. Nolan on short circuit issues for “Other Business” and asked if there were any others, none were noted.

**Safety topic**

- Mr. Couture followed up on the last OC safety topic which discussed Lyme disease and the importance of checking for ticks when coming in from working outdoors. Mr. Couture shared a presentation that covered aspects of the issue including description of the symptoms,

**Minutes approval**

- Mr. Mason moved and Ms. Burt seconded approval of the minutes of June 20, 2013. Mr. Perry noted the omission of his name from the attendees. The amended minutes were approved without dissent.

**Telecommunications**

Since the OC Agenda contains many items to cover Mr. Renaud suggested that the telecommunications report out be abbreviated to a report on Statewide Radio Project (SRP) and then covering of two items for decision by the OC which include disposition of the “Head End” equipment on the fiber project and the addition of communications equipment for integrating switches and reclosers on the 34kV system.

- **Statewide Radio Project (SRP) update**
  - Mr. Nelson provided a brief update of the status of the SRP which included the following:
    - The team continues to work with GMP to address perceived performance issues with the system, most improvements have been linked to better training on the system combined with technical and coverage items being addressed.
    - Once the new combiners are received and deployed then the equipment will be in place to address issues with the hand off of communications across the system.
    - G. White noted that some improvement has been observed in the Poultney area, however coverage issues exist in Sunderland.

- J. Wright noted that until recently he felt that VEC was not experiencing issues as noted by GMP, however, with in the last few days concerns over the performance of the system have been noted (after crews were directed to turn off the “old” radios). Mr. Wright provided a brief description of the problems he has observed.
  - D. Nelson mentioned that the issues described by Mr. Wright appear to be training or “user” issues and offered to work with VEC to provide more training on the system.
- **Fiber Project update**
  - A. Stamp provided a quick update on the Fiber installation activities which include work with GMP, VEC, and Stowe.
  - Mr. Stamp noted that the focus of the work this fall was to close the “Fiber” project as overhead costs need to be managed. He also noted that the system will have ongoing smaller capital additions which have been addressed in the 2014 and 2015 budgets. Small work scopes not completed in 2013 will be tackled in subsequent years.
  - Mr. Stamp then followed up on the request to add the costs for the “Head End” equipment to the project under the DU Lit portion. He presented an analysis of potential costs that may impact the project showing that the cost could result in as much as \$380k being added to the project. However, the project still has approximately \$1M of contingency still available. Mr. Stamp noted that the addition of this equipment made sense since then VELCO would own the entire system and that the omission from the original scope was an error.
  - Mr. Nolan noted that the cost would be directed back to the benefiting utility through the Network Access Agreement (NAA) already in place. He also noted that if the costs paid under the NAA were noted on the appropriate filings with the state that there would be no cross-subsidizing of equipment.
  - This request was approved through consensus and the work will be added to the scope of the effort.
  - D. Nelson then provided an update on another scope addition to the DU Lit fiber portion of the project concerning the establishment of communications to certain switches and reclosers on the 34kV system as well as extending the system to generators. The scope of the fiber project has been limited to providing communications to 34kV substations serving more than one customer. Through the Telecommunications Operating committee GMP has requested that the scope be adjusted to include switches/reclosers on the 34kV system as well as extending communications to generators.
  - Discussion by the group ruled out the extension of system to generators at VELCO’s costs.
  - However the group was open to adding the switches and reclosers, Mr. Nelson was directed to return to the OC with an amendment to the NAA adding this equipment to the agreement.
  - Mr. Nelson asked that the OC allow VELCO to proceed with the addition of the switches and reclosers pending approval of the NAA language. His request was agreed to.

#### **Power Accounting Update**

- Mr. Omand presented the materials provided to the OC there were no comments or discussion on his material.

## Space Weather and Power Grids

- Antti Pelkkinen and Carrie Black from NASA joined the Committee to discuss their work on space weather and its impact on power grid systems. Mr. Pelkkinen described the reasons for their visit as educating the Committee on what the state of the art questions in the area of forecasting the effects of space weather on the power grid and to seek research partners for their work.
- Mr. Pelkkinen described some of the current research and thinking in this area including the latest NERC study that suggests long term system blackouts from widespread transformer failures is not likely because voltage collapse will happen before long term damage to power transformers occurs. This is in response to the belief that space weather could cause long-term widespread power outages by failing a large number of our nation's transformers at the same time without adequate backup and the lead time with manufactures producing replacements.
- Mr. Pelkkinen described how solar weather creates Geomagnetically Induced Currents (GIC) on the Earth's surface and discussed relevant factors that influence how the power grid is affected including system voltage and geological differences in the Earth's surface. GICs can have a magnitude of millions of amps and generally only impact transmission lines above 200 kV since lower voltages have higher resistivity. Higher ground resistivity blocks GIC in the ground and forces them onto lower resistivity transmission lines. GICs have significantly amplified effects above 50 degrees geomagnetic latitude; all of Vermont is above this latitude. In addition New England is on top of igneous rock, which has high resistance that will magnify to effects of GICs.
- Mr. Pelkkinen stated that he is involved with the NERC GMD Task Force and Standard Drafting Team. NERC is considering what type of event should be planned for (e.g. a one in 100 year event or a 1 in 50 year event).
- Mr. Johnson asked about the solar magnetic field flipping. Mr. Pelkkinen explained that the sun's magnetic field reverses every 11 years as part of its solar cycle. The Earth's magnetic field does the same although it only happens once in hundreds of thousands of years. He also explained that that the time for solar weather events to propagate to earth range from 1 to 3 days with an extreme of as little as 17 hours.
- Mr. Pulkkinen then described their Solar Shield project, which is an experimental system to forecast space weather effects on the North American power grid. This project is a joint NASA, Goddard Space Flight Center, Community Coordinated Modeling Center, and EPRI research project. The project consists of a two level forecasting; level one is long lead time forecasting and level two is forecasting 15-30 minutes out. Long lead forecasting consists of observations of eruptive events to provide probabilistic estimates of GIC at individual nodes of the transmission system. Level two forecasts consist of more detailed modeling of the dynamics of the Earth's magnetosphere and ionosphere to provide GIC at individual nodes.
- Mr. Pelkkinen stated that they are in a pilot phase for GIC measurements and that they would like to partner with entities to place measurement devices (magnetometers) under power lines to measure GICs. Eventually the goal would be to have hundreds of sites across the US. Mr. Pelkkinen stated that NASA and the utilities could work together on forecasting and the measurements pilot and that he is interested in looking at other areas to collaborate.
- Mr. Renaud suggested that the committee digest this information and included a future Committee agenda item to discuss potential next steps. The committee agreed.

## Solar Magnetic Disturbances

- Mr. Haas presented the detailed material distributed to the Committee in advance of the meeting noting that much of the initial material was discussed with the previous agenda item. He described some of the major concerns to utilities including transformer core saturation that can lead to increased VAR absorption and transformer damage and increased harmonic content that can lead to HVDC commutation failures, protection and control misoperation and generator rotor overheating.
- Mr. Haas described VELCO's space weather monitoring activities that include operators having access to space weather alerts and "K" index levels on a three-hourly basis. Mr. Wright asked if the Highgate DC connection protects us from issues on the HQ system and if we monitor HQ frequency in real time. Mr. Haas responded that we do have visibility of HQ frequency and that the DC protects us from power system events although GIC can affect the converter because of the harmonic problems described earlier.
- Mr. Haas described that both VELCO and ISO monitor and report on Solar Magnetic Disturbances (SMDs) and that this is also part of Roger Hill's weather service and included in the VT Emergency Preparedness program.
- Mr. Haas briefly described High-altitude Electromagnetic Pulse (HEMP) issues and effects on the transmission system. Mr. Pelkkinen stated that NASA is not involved in discussion on HEMP.
- Mr. Haas described VELCO Operating Procedure OP-41 on how VELCO operates during an SMD. He described the actions and responsibilities of both VELCO and the VT DUs, which occur for Kp 7 or greater activity. Mr. Pelkkinen noted that the problem with the K index is that it's global and does not change by location and that GIC phenomenon is very local.
- Mr. Haas described VELCO's 2013 and 2014 projects to install GIC monitoring. Mr. Nolan asked why we can't solve NASA's needs with the equipment VELCO is installing. Mr. Pelkkinen responded that the data they would be gathering is likely not the same as needed by utilities. Mr. Pelkkinen noted that they can provide advice on capturing data to make our program more effective.
- The Committee discussed the need to get more information on the NASA and VELCO activities and how to bring these efforts together. Mr. Johnson agreed to take the lead in starting a conversation on this effort.

#### **VELCO Vegetation Management Update**

- Mr. Disorda presented the detailed material distributed to the Committee in advance of the meeting.
- Mr. Disorda discussed tree related outages in New England during a number of significant weather events over the last couple of years including Hurricane Irene and the October snow storm in 2011 and Hurricane Sandy in 2012. He showed that the VELCO transmission system performed extremely well during these events; VELCO did not have any tree related outages during these events while other New England utilities experienced a significant number of outages.
- Mr. Disorda described VELCO's 2012 vegetation management cycle and work plan noting that while the amount of work has been increased, actual spending has remained flat since 2010. Mr. Johnson asked the DUs if they are cutting more vegetation than in the past. Mr. Wright responded that in 2008, they agree with the Department to more cutting and they have maintained that level since; prior to 2008 they had not been doing a lot. Others on the committee responded that they have been doing more. Mr. Johnson asked if they have been seeing improvements from their latest vegetation efforts. Mr. Couture responded that the direct correlation has been hard to measure since there are other factors such as weather that have such a large affect.
- Mr. Disorda described how VELCO is using Lidar to improve the efficiency and effectiveness of the vegetation management program and how that has made a difference in identifying danger trees farther back off the R.O.W. into the woods.

- Mr. Mason asked about the annual mandatory notice and coupon distribution with regards to the use of herbicides sent out by VELCO and the DUs; why do the coupons go back to the DUs even if the DU doesn't have an herbicide program or VELCO facilities? Mr. Disorda responded that the program calls for all notices to go to the DU first then from the DU to VELCO. Mr. Disorda agreed to look back at the program to see if any adjustments could be made to have coupons returned directly to VELCO.
- Mr. Disorda summarized the NERC vegetation standard requirements, how VELCO is meeting those standards and the results of the NPCC audit conducted in March of 2012 which resulted in a "No Finding" by NPCC. Mr. Disorda also reviewed the September 2012 NATF peer review noting the observations, recommendations, and strengths identified during the review.
- Mr. Disorda summarized the aerial patrols, access road maintenance, and capital projects work done in 2011 and 2012 including work done on the VETCO HVDC line. Mr. Disorda also described the continued training and certification the foresters are receiving to keep up with the latest techniques and methods and new partnerships VELCO has entered into with Audubon Vermont and the American Chestnut Foundation.

### **Other Business**

- Mr. Nolan described an issue BED is having with short circuit levels on their system. Studies they have commissioned are showing available short circuit currents above the ratings of their equipment. They are concerned that VELCO has made changes to the system over time, such as new transformers at East Avenue and Queen City, which have raised the short circuit levels and have made it difficult to allow new renewable generation to connect to the system since they will only add to the problem. He also pointed to the Tafts Corner substation project where changes were made to limit short circuit and questioned why that was done there and not Queen City/East Ave. Mr. Renaud responded that the short circuit issues were known when these projects were done and steps were taken to limit the impact. These steps include operating the system open at East Avenue. Mr. Renaud also noted that there are many system changes that have occurred over time that are contributors to increased short circuit including the NRP, system changes associated with Winooski and BED gas turbine generation, and normal load growth. He stated that VELCO is gathering data to analyze the short circuit levels over time and the drivers for the changes. He also stated that the Transmission Subcommittee is meant to be a place to bring visibility to these types of problems. Mr. Nolan stated that there are two separate issues here: one being an immediate short circuit issue that BED and VELCO can work on and one a more global issue that the Operating Committee needs to consider. The latter issue is how to manage the system overall with respect to standards (e.g. standard transformer impedances, etc.) and system changes. Without this, it will be more difficult to meet Vermont's policy objectives of connecting renewable generation. Mr. Nolan also stated that they have not seen any activity on the Transmission Subcommittee. Mr. Renaud responded that there has not been much interest from other DUs. Mr. Wright responded that it was not because of lack of interest, rather for VEC, it is their ability to cover all the meetings they are being asked to attend with limited resources. This prompted a discussion regarding all the committees including the VSPC and various subcommittees such as the Geotargeting subcommittee; the VSOC; and the Transmission Subcommittee. All companies are finding it difficult to staff these committees. Mr. Johnson stated he would take this feedback for consideration and further discussion.

### **Proposed future agenda topics**

- Engagement opportunities with NASA on GIC

## **Adjournment**

- A motion was made and seconded and the meeting was adjourned at approximately 3:30 pm.