NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Meeting Minutes

System Protection & Control Subcommittee

April 14-15, 2015

Oncor Electric Delivery
Ft. Worth, TX

Administrative

1. **Introductions**

   The meeting was brought to order by Mr. Winston, chair, at 8:09 a.m. CT, Tuesday, April 14, 2015. He requested those in attendance introduce themselves. The host, Sam Francis provided a safety briefing and housekeeping. Those in attendance over the two day meeting were:

Name	Company	Member/ Observer	In-person (IP) / Web (W)	
			4/14	4/15
Philip Winston	Southern Company	Chair	IP	IP
Richard Quest	Midwest Reliability Organization	Vice Chair	IP	IP
Bajarang Agrawal	Arizona Public Service Co.	Member	-	-
Forrest Brock	Western Farmers Electric Coop.	Member	IP	IP
Samuel Francis	Oncor Electric Delivery	Member	IP	IP
David Greene	SERC Reliability Corporation	Member	-	-
Mark Gutzmann	Xcel Energy, Inc.	Member	IP	IP
Jeffrey Iler	American Electric Power	Member	IP	IP
Sungsoo Kim	Ontario Power Generation Inc.	Member	-	-
Miroslav Kostic	Hydro One Networks, Inc.	Member	IP	IP
Quoc Le	Northeast Power Coordinating Council	Member	IP	IP
Michael McDonald	Ameren Services	Member	-	-
Daniel McNeely	Tennessee Valley Authority	Member	-	-
William Miller	Exelon Corporation	Member	IP	IP
David Penney	Texas Reliability Entity, Inc.	Member	IP	IP
Michael Putt, P.E.	Florida Power & Light Co.	Member	-	-

Name	Company	Member/ Observer	In-person (IP) / Web (W)	
			4/14	4/15
Charles Rogers	Consumers Energy	Member	-	-
Lynn Schroeder	Westar Energy	Member	-	-
Jonathan Sykes	Pacific Gas and Electric Company	Member	IP	-
Joe Uchiyama	U.S. Bureau of Reclamation	Member	IP	IP
George Wegh	Northeast Utilities	Member	IP	IP
Bill Crossland	ReliabilityFirst Corp.	Observer	IP	IP
Sara Filling	Baltimore Gas & Electric Company	Observer	-	-
Armin Klusman	CenterPoint Energy/Houston Electric	Observer	IP	IP
Sandeep Sadanandan	Federal Energy Regulatory Commission	Observer	W	-
Scott Barfield-McGinnis	North American Electric Reliability Corporation	NERC Staff	IP	IP
Amir Najafzadeh	North American Electric Reliability Corporation	NERC Staff	IP	IP

2. **Determination of Quorum**
   NERC committee meetings require two-thirds of the members to meet quorum when a particular matter requires a vote. Quorum was achieved each day as 10 of the 14 voting members were present.

3. **NERC Antitrust Compliance Guidelines and Public Announcement**
   NERC Antitrust Compliance Guidelines and public disclaimer were presented by the chair. There were no questions. Each day, the chair reminded participants that the NERC Antitrust Compliance Guidelines and public disclaimer remain in effect.

4. **Review Roster**
   Chair reviewed the latest roster with the team.

Agenda Items

1. **Agenda**
   Mr. Winston reviewed the meeting agenda for the two day meeting. Mr. Sykes made a motion to approve the minutes as presented. The motion was second and approved unanimously.

2. **Meeting Minutes**

   The August 2014 minutes were reviewed by attendees. Mr. Winston acknowledged Mr. Phil Tatro, former SPCS NERC staff coordinator for providing the meeting notes. Mr. Miller made a motion to approve the August 2014 meeting minutes. The motion was second and approved unanimously.

   The October 2014 meeting minutes were also reviewed. Mr. Quest had a few questions about details concerning the Order No. 754 discussion. Approval of the meeting minutes was deferred for approval during the second day of the meeting. On the second day, Mr. Quest agreed the minutes were sufficient as presented during the meeting. Mr. Gutzmann made a motion to approve the October 2015 meeting minutes. The motion was second and approved unanimously.

3. **Order No. 754 Data Request** Mr. Winston noted that the NERC System Analysis and Modeling Subcommittee (SAMS) will need to review the draft report at their April meeting. He further noted that NERC staff reviewed the draft document and asked Mr. Barfield to update the attendees on the remaining issues. Mr. Barfield noted that the report is well written and the group would only need to address the exceptions identified in the draft by Mr. Quest and NERC staff.

   a. Review draft report

      The first question was about text concerning references to the interpretation that was approved by FERC Order No. 754.1 The group reviewed the two interpretation questions and responses as found in the approved NERC Reliability Standard TPL-003-0b (System Performance Following Loss of Two or More Bulk Electric System Elements (Category C)).2 Footnote 7 of the report was reviewed and it was decided to retain the footnote for clarity.3

      There was additional discussion about the statement concerning "…single point of failure in a protection system was modeled as resulting in a failure to trip and failure to initiate breaker failure protection." The group decided that the following text is clearer. "Transmission Planners were to simulate clearing based on the remote protection that would operate for the bus fault. The Transmission Planners were not to simulate operation of any local protection unless the only single point of failure for protection systems on all Elements connected to the bus and the physical

[1] FERC Order No. 754. September 15, 2011. Docket No. RM10-6-000. 136 FERC ¶ 61,186.
[2] NERC Reliability Standard TPL-003-0b
[3] Footnote 7: "In cases where the only single point of failure is a single trip coil for protection systems on all Elements connected to the bus, Transmission Planners were allowed to model operation of the local breaker failure protection."

bus(es), if any, is a single trip coil and local breaker failure protection is provided, in which case operation of the breaker failure protection may be modeled."

Mr. Quest emphasized that clearing time references should be "maximum expected" clearing time in the discussion under the heading, Table 1: Buses Evaluated by the Transmission Planner. The reason is that later in the discussion the text references "actual clearing" time. The group accepted the following insertion in the second paragraph under heading, Table 2-7 Data: Attributes of Evaluated Protection Systems. "The single points of failure reported in Tables 2 through 7 are related directly to the buses at which the Transmission Planner identified a potential risk based on simulation of a three-phase fault and protection system single point of failure [using maximum expected clearing times]."

The group discussed the text under the heading, Communications. Mr. Quest commented that the paragraph is essentially correct in that single point of failure in communication systems are a much lower (though not zero) concern for the dependability issues addressed in this data request. They can present security issues that affect reliability, but the affect is reduced by increasing redundancy. The conclusion was that the report did not need any further detail regarding communication related issues.

Under the Conclusion section, the group discussed the first bullet about changing "relay failure" to a "Protection System failure" concerning the analysis of extreme events. Mr. Barfield suggested the group consider the NERC Board of Trustees adopted Glossary of Terms Used in NERC Reliability Standards term "Composite Protection System."[4] The group was concerned about how industry understands the term "composite." Additionally, in addressing the concern about single points of failure may not be adequately represented within the adopted term "Composite Protection System." There was discussion about using the term "non-redundant" to be consistent with TPL-001-4 (Transmission System Planning Performance Requirements). The conclusion was to replace the term "relay failure" with the NERC defined term resulting in "Protection System failure."

There was a question about whether the reference to Requirement R4, Part 4.5 for extreme events was meant for "stability" studies or should it be Part 3.5 for "steady-state" studies. The subcommittee concluded that it applies to extreme events involving three phrase fault studies in TPL-001-4. This is indicated under the Table by Item #2 under the extreme events, Stability column on the right. The result was that the group removed the reference to Part 4.5 and clarified the proposed sentence "[t]he list shall include events from each 'category' of extreme events in Table 1." The aforementioned sentence was replaced with "[t]he list shall include each of the extreme events in Table 1; Stability column item number 2."

[4] Adopted August 14, 2014. Composite Protection System is defined as "[t]he total complement of Protection System(s) that function collectively to protect an Element. Backup protection provided by a different Element's Protection System(s) is excluded."

Mr. Miller raised a few minor comments that the group addressed. For example, the Executive Summary appeared to be a copy of the recommendations; however, it was slightly different. The summary was updated due to inconsistencies. A concern was raised about the conclusion of the report that the risk to reliability is low when a reader may perform a simple quantitative analysis of the data from Appendix B and not draw the same conclusion. For example, the number of transmission line terminals at which protection systems does not meet all of the specified protection system attributes for redundancy in Table B is more than half of the buses evaluated.

Mr. Miller suggested adding a paragraph to discuss loss of potential. Mr. Quest recommended modifying this existing paragraph to keep the thought together. For example, the loss of an AC input may be alarmed as an imbalance or identified by a dispatcher and even through state estimation. He also pointed out that the report did not have any of the original analysis by voltage that supports the conclusions and the level of risk to reliability that might be present. The group reviewed the following table from the draft report.

Buses Evaluated by the Transmission Planner						
Row	**Description**	**>= 100 kV**	**>= 200 kV**	**>= 300 kV**	**>= 400 kV**	**>= 600 kV**
3	Total number of buses evaluated by the Transmission Planner based on actual clearing times:	716	813	356	164	44
4	Total number of buses evaluated by the Transmission Planner based on actual clearing times that resulted in system performance exhibiting any adverse impact defined in Table C, "Performance Measures:"	160	316	212	101	43
4a	Percentage of buses evaluated by the Transmission Planner based on actual clearing times that resulted in system performance exhibiting any adverse impact defined in Table C, "Performance Measures:"	22%	39%	60%	62%	98%

Members noted that the above table is one of the reasons that details of the analysis was not included in draft report. There were limitations with how the data

could be statistically evaluated to provide meaningful conclusion. Because of this, the SPCS did not provide the above quantitative analysis.

b. Approve for submission to SAMS for review and approval

Other minor edits were made. Mr. Wegh made a motion to approve the draft report for submission to SAMS to review and approve so that the report may be presented at the June 2015 NERC Planning Committee (PC) meeting. The motion was second and approved unanimously.

4. Power Plant and Transmission System Protection Coordination

a. Review technical guideline revisions

The group reviewed changes in the SPCS Power Plant and Transmission System Protection Coordination document. Revisions were primarily clarifying and cosmetic. Mr. Quest was tasked with making a few additions following the meeting.

b. Develop schedule for final review and approval

The SPCS agreed to send the technical guideline to the SAMS for review and approval at their April 2015 meeting. Following SAMS approval and any subsequent clean up by the SPCS, the document will be delivered to NERC staff to request it as an approval item on the June 2015 PC meeting agenda. The agenda item title will be: Considerations for Power Plant and Transmission System Protection Coordination Technical Guideline. Philip Winston, Chief Engineer Protection and Control Applications, Southern Company will be the presenter. The request to the PC will be the approval of the Technical Guideline Rev.2. There will be a presentation approximately 15 minutes long. A clean and redline versions of the document, and the consideration of public comments will be provided to the PC in advance.

A motion to approve the draft technical guideline for submission to SAMS to review and approve was not made in order for Mr. Quest to do additional work prior to approval.

5. Unit Auxiliary Transformer (UAT) Protection

a. Review draft of report.

The SPCS reviewed the current draft of the report. Questions were raised about what is the objective of the report. For example, should it be a reliability guideline or a report. Mr. Barfield gave a background on the purpose of the SPCS work, which is to prepare a report to decide whether a guideline is sufficient for addressing the low side UAT relays in PRC-025-1. The work was based on the minority unresolved issue from the previous adoption of the PRC-025-1 standard and if a guideline is not sufficient, to recommend that PRC-025-1 be revised to include the low side UAT relays.

b. Have several additional companies review so that it can be considered representative on industry practice.

   It was suggested to request Mr. Bill Middaugh's generation staff at Tri-State Generation and Transmission and Sudhir Thakur at Exelon Nuclear Generation to provide feedback as generation subject matter experts.

c. Develop sub-team to work on report based on industry review.

   Mr. Brock, Mr. Gutzmann, and Mr. Sykes accepted to work on the document once in the NERC report template.

d. Goal to have final draft ready for the next SPCS meeting.

6. **Review of PRC Standards Under Development (Discuss)** (Wednesday 4:00 – 4:45 p.m.) [No follow-up action required]

   a. NERC staff overview of PRC standard development – Mr. Winston update the attendees of how the PRC-027 standard is structured. It is currently posted for 45-day comment

   b. PRC-001-1.1 and PRC-027-1, System Protection Coordination – Mr. Barfield provided an update on the drafting team approach to revising PRC-001-1.1.

   c. PRC-002-2, Disturbance Monitoring – On the FERC agenda for Thursday, April 16, 2015 to approve.

   d. PRC-004-3, Protection System Misoperations – Still has not come up for FERC approval. Mr. Barfield thought its delay might be a result of the Commission waiting to see the outcome and filing of the work being balloted concerning Misoperations of UVLS equipment under the proposed PRC-004-5 and PRC-010-2.

   e. PRC-005-3, Protection System Maintenance and Testing – Addition of Reclosing Schemes: FERC approved the standard with a directive to add "Supervisory Relays associated with reclosing schemes," which includes Synch-check and volt-check relays are considered the supervisory relays. This was part of the FERC directive. A SAR was posted for comment which closed last week and the SDT is meeting next week to review those comments and start working on the revisions to PRC-005.

   f. PRC-005-4; Protection System Maintenance and Testing – Includes the addition of Sudden Pressure Relays. It is NERC BOT adopted and has been filed for approval with FERC. Discussions are occurring to harmonize the implementation dates of the incremental implementation of the various PRC-005 versions.

   g. PRC-006-2 and PRC-010-1; Underfrequency and Undervoltage Load Shedding – The standard PRC-010-1 was adopted in 2014 and PRC-006-2 passed in 2015 and is being prepared for filing.

   h. PRC-026-1; Protection System Response to Power Swings – The standard was NERC Board of Trustees adopted in December 2014 and filed with regulatory authorities.

i. PRC standard revisions to address dispersed power resources (DGR) – The DGR initial set of standards are filed with FERC and awaiting approval.

j. Definition of Special Protection System/Remedial Action Scheme – The definition was NERC Board of Trustee adopted along with a group of standards that were modified to replace SPS with RAS. The work has been filed with FERC.

7. Next Steps

a. Contact Ganesh Velummylum, NERC PC staff coordinator and obtain the deadlines for agenda and materials submission for the June PC meeting.

b. NERC staff to locate the Power Plant comments and responses from June 2014. Clean up and ensure they are ready for presentation to the PC in June.

c. Order No. 754 Report.

i. Provide the draft report to NERC SAMS Coordinator for distribution with a request that SAMS members read and be prepared to discuss at their April meeting and to allocate time for SPCS members to participate.

ii. Provide the draft report to NERC editorial staff for a preliminary review and comment to be completed prior to the SAMS meeting.

iii. Present draft report at the SAMS April 2015 meeting.

iv. Following SAMS approval, present draft Order No. 754 report at the June 2015 PC meeting, request reviewers, and present final draft for approval at the August 2015 PC meeting.

v. Following SAMS approval, present final report at the June 2015 PC meeting, request reviewers, and present final draft for approval at the August 2015 PC meeting.

vi. Prepare a presentation and present at the June 2015 PC meeting requesting approval.

d. Power Plant and Transmission System Protection Coordination Report.

i. Locate the comment and responses to comments that were a result of the PC authorizing the posting for a 45-day industry comment period in June 2014.

ii. Provide the draft report to NERC SAMS Coordinator for distribution with a request that SAMS members read and be prepared to discuss at their April meeting and to allocate time for SPCS members to participate.

iii. Provide the draft report to NERC editorial staff for a preliminary review and comment to be completed prior to the SAMS meeting.

iv. Present draft report at the SAMS April 2015 meeting.

v. Following SAMS approval, present final report at the June 2015 PC meeting, request reviewers, and present final draft for approval at the August 2015 PC meeting.

vi. Prepare a presentation and present at the June 2015 PC meeting requesting approval.5

e. Unit Auxiliary Unit Transformer report.

i. NERC staff are to place the draft contents into the NERC template document for reports.

ii. Mr. Gutzmann and Mr. Sykes agreed to assist in cleaning update the content once in the NERC report template.

iii. Contact and request Mr. Bill Middaugh generation staff at Tri-State Generation and Transmission and Sudhir Thakur at Exelon Nuclear Generation to provide feedback as generation subject matter experts.

8. Future Meetings

a. Availability for the next SPCS meeting will be addressed in June. The chair noted that given the current level of work, there is a reluctance to pre-schedule future meetings and the number of days needed to complete activates.

9. Adjourn

The meeting adjourned at 11:45 Central on Wednesday, April 15, 2015.

[5] See Appendix A.

APPENDIX A

Excerpt from the NERC BOT approved PC Charter.[6]

Report Category	Review Process	Approval process
Reliability guidelines	*The specific review process found below for Reliability Guidelines will be followed* 1) A draft guideline will be provided to the PC at a regular meeting. 3) After the 45 day public comment period, the comments received as well as draft responses to the comments will be provide to the PC at a regular meeting.	*The specific approval process found below for Reliability Guidelines will be followed.* 2) At the regular meeting, the PC will consider the draft guideline for approval to post for comments. 4) At the regular meeting, the PC will consider the draft guideline, including the comments received and responses for approval to post as final.
All other reports developed by a PC subgroup to be posted on NERC's Website when completed (technical documents, white papers, special assessments, etc.)	1) A draft report will be submitted to the PC at a regular meeting.	2) A draft report will be submitted at one meeting, with the opportunity to provide comments both during and after that meeting. Unless directed by the PC in its review of the draft report, there is no specific requirement for public posting and comment since the PC agenda that contains the draft report is publically noticed. 3) A final report may be considered for approval no earlier than the next meeting, unless the PC decides to act sooner.

[6] PC Charter updated November 7, 2013.