

Meeting Notes

Project 2010-13.3 – Relay Loadability: Stable Power Swings Standard Drafting Team

March 26, 2014

1:00 p.m.-2:00 p.m. Eastern

Conference Call

Administrative

1. Introductions and chair remarks

The meeting was brought to order by Mr. Jones, vice chair, at 1:02 a.m. Eastern Wednesday, March 26, 2014. He thanked everyone for joining to discuss the proposed changes to Requirements R2 and R3. Mr. Barfield took roll of members and observers. Those in attendance were:

Name	Company	Member/ Observer
Kevin W. Jones, P.E.	Xcel Energy, Inc.	Vice Chair
David Barber, P.E.	FirstEnergy	Member
Steven Black	Southern Company	Member
Fabio Rodriquez	Progress Energy – Florida	Member
John Schmall	Electric Reliability Council of Texas (ERCOT)	Member
Matthew H. Tackett, P.E.	Midcontinent Independent System Operator (MISO)	Member
Syed Ahmad	Federal Energy Regulatory Commission (FERC)	Observer
Ken Hubona	Federal Energy Regulatory Commission (FERC)	Observer
Scott Barfield-McGinnis (Standard Developer)	North American Electric Reliability Corporation (NERC)	Observer
Michael Gildea (Regulatory)	North American Electric Reliability Corporation (NERC)	Observer
Phil Tatro (Technical Advisor)	North American Electric Reliability Corporation (NERC)	Observer
Ramzi Chahine	Hydro Québec	Observer
David Youngblood	Consultant (Luminant Energy)	Observer

2. Determination of quorum

The rule for NERC Standard Drafting Team (SDT or team) states that a quorum requires two-thirds of the voting members of the SDT. Quorum was achieved as six of the nine members were present.

3. NERC Antitrust Compliance Guidelines and Public Announcements

NERC Antitrust Compliance Guidelines and public disclaimer were reviewed by Mr. Barfield. There were no questions. Mr. Barfield also referred everyone to the two new NERC policies and demonstrated where to find them on the NERC website. The policies are related to use of the email listserv and standard drafting team meeting conduct.

4. Review team roster

Mr. Barfield noted that the roster is posted on the NERC project page and has not been changed since being initially approved by the Standards Committee.

5. Review meeting agenda and objectives

Mr. Barfield reviewed the meeting agenda and objectives noting that the team would be reviewing Mr. Schmall's proposed revisions to Requirements R2 and R3 and, if time permits, the rationale text that Mr. Middaugh prepared and distributed to the team earlier.

Agenda

1. Continue with Standard Development

Mr. Jones started off with having the team look at Mr. Middaugh's changes to Requirement R1, Criterion 5. The team had no issues with the change and Mr. Tatro affirmed the change. Next, Mr. Schmall begin with his proposed edits from the last meeting starting with Requirement R2. He removed the time element for performing the Requirement because it is within the same period with Requirement R1 and is essentially on an annual basis. Second, he question the capitalized term "Stable Power Swing" because he had not seen a proposed definition and it was not in the Glossary of Terms Used in NERC Reliability Standards ("glossary"). Mr. Barfield noted that it was previously proposed in some documents, but the team had not really discussed the definition. He further recommended the team away from defining a term unless absolutely necessary. Additionally, recommended adding a discussion about it in the Application Guidelines and when socializing the standard and/or when it's posted see whether or not stakeholders raise concerns. If so, formalize it as a defined term in the glossary. Third, he believed the original wording was associated with the "Element" rather than the power swing itself. He questioned if the team should discuss more on what the power swing characteristic should look like.

Mr. Jones asked about the removal of the time period elements (removing "three months"). He is concerned that removing the time period would make the Measures difficult and auditable. Mr. Schmall did not believe they were necessary and did not add to making the

BES more reliable. For example, as a planner works through their assessment, they may need to reprioritize work that would exceed three months. He believed if the planner performed the work within that planning cycle it would be sufficient. Mr. Jones noted he was okay with the change at this time given the way Requirement R3 is structured.

Mr. Youngblood asked about the criteria that would be provided to the relay owners (e.g., slip rates, etc.) as a part of Requirement R2. Mr. Jones theorized that the standard may need to employ a similar approach as PRC-023 by including an appendix of criteria for the planner to be able to address the criteria for determining the worst case condition when simulating power swings. He gave a scenario for simulation, for example, loading a line to an extreme and modeling a fault to determine the power swing characteristic. Mr. Tatro believed that TPL-001-4 would not provide sufficient information. A reasonable amount of additional detail in an attachment that would be referenced in the Requirement would be a good idea. Mr. Tackett agreed and thought two items were important. First, the information the planners need to develop for the relay owner. Second, the criteria for the planner to determine the worst case stable power swing. Mr. Schmall is concerned that the number of simulations will become exponential and unmanageable for the planner. Mr. Tatro concurred.

Mr. Jones suggested adding additional text referencing the attachment containing the criteria for the planner. Mr. Barber was concerned that the additional clause to R1 (“... and according to the criteria in Attachment 1”) would create additional work on the planners. He previously understood that the intent was to use the existing studies and a margin on the relay would account for other cases. Mr. Tatro agreed that using existing studies was best, but recognized that a planner may need to re-run the most limiting case. If so, additional boundaries would be needed for the planner when re-running a study. Mr. Barber asked if the “worst case” is necessary. Mr. Tatro noted that like PRC-023-2 that this standard should account for slightly more than just the normal planning study. The criteria to be developed in Attachment 1 would go the next step to ensuring security for a stable power swing while ensuring dependability for an unstable swing. Mr. Barber suggested a safety margin above the planning contingencies as a minimum point. Mr. Tatro agreed that would be one approach, but to include the studies as well. Mr. Schmall is concerned that finding the worst case imposes a lot of work and has too many variations that must be accounted for by planners. Mr. Barber noted that trajectories may be faster or slower and will impact how studies are performed. Mr. Tatro theorized that the worst case could be determined by the criteria that would be applied by the proposed Attachment 1. It is reasonable to look beyond the planning contingencies and provide a criterion to provide more accurate determination of the power swing characteristics. Mr. Tatro believed that the simple planning study, by itself, is not sufficient for determining the power swing characteristic. He further noted that Regions may approach the study of power swings differently based on how the contingencies are applied as well as any margins. An Attachment would bring consistency to the planners approach when using a margin or other criteria. Mr. Tackett affirmed using the margin approach and when finding the worst case using the Attachment 1 criteria. He also noted that worst case would need to have parameters.

Mr. Jones recommended staying with the additional clause in Requirement R2 because he believed that TPL-001-4 did not provide adequate simulation.

The team moved on to Requirement R3 pending the development of Attachment 1. Mr. Schmall asked if the time element needed to remain. Mr. Jones noted the timing element in Requirement R4 and recommended tabling for a future conversation due to time. Otherwise, he was okay with Requirement R3 as well. Mr. Tatro echoed the same sentiments that R1-R3 are being done together each year. Mr. Schmall noted to return the instances of “Stable Power Swing” to lower case.

Mr. Jones directed the team to the rationale text provided by Mr. Middaugh and asked for feedback. Mr. Tackett was in agreement and had a couple of questions around “challenged by.” It would be good to account for relays that are not set optimally and once the relay settings are corrected, they would not be subject to the standard. Likewise, when an Element is no longer “challenged” by a stable power swing that it could be removed from the list for compliance by the planner and performance by the relay owner. Mr. Schmall believed the planner would follow the standard when determining if an Element is “challenged” each year. Mr. Tatro noted that once the planner knows how the protection behaves, he would expect it to incrementally reduce the amount of work the planner would be subject to in future years. Mr. Gildea recommended removing the second occurrence of “annual” in the last sentence of Rationale #1 (Requirement R1).

Mr. Tatro had a question about the changes from the SPCS Report¹ and seemed like the rationales only support why the team changed items and not the bulk of the SPCS Report. Mr. Barfield noted that it would be good to have an introductory section in the Application Guidelines that reference the SPCS Report to give a basis for the standard. Then each of the Requirement rationales could further explain any deviations. Mr. Jones asked if there is any NERC guidance concerning the rationale. Mr. Barfield noted that in the Results-based Standard (RBS) structure that most think of the rationale as being “rationale boxes” that accompany each Requirement. Furthermore, the Application Guidelines would expand on the basic intent and reason for the Requirements found in the rationale boxes. The team may decide how it approaches writing the Application Guidelines. Mr. Barfield noted that rationale and technical basis may be together or separate. Whatever makes sense to the team to present to the reader.

2. Review of the schedule

Time did not permit reviewing the schedule.

3. Action items or assignments

Team – Consider approaches to having a timing element in Requirement R3. Also, re-read the rationales for the meeting on Friday, March 28 at 1:00 p.m. Eastern.

¹ NERC System Protection and Control Subcommittee, Protection System Response to Power Swings, August 2013 http://www.nerc.com/comm/PC/System%20Protection%20and%20Control%20Subcommittee%20SPCS%20/SPS%20Power%20Swing%20Report_Final_20131015.pdf

Mr. Barfield – Make “Stable Power Swing” lower case. Also, provide the team logistic details on the NERC Atlanta offices for the meetings next week.

Mr. Rodriguez – Need to follow up on an earlier meeting item about “Series Reactors” being included in the Applicability.

4. Next steps

Review rationales.

5. Future meeting(s)

Conference call Friday, March 28, 28, 2014 | 1:00 p.m.-2:00 p.m. Eastern

In-person meeting the week of March 31 beginning at 1:00 p.m. Eastern

6. Adjourn

The meeting adjourned at 2:08 p.m. Eastern on Wednesday, March 26, 2014.

DRAFT

Copy of draft for reference:**A. Introduction**

1. **Title:** **Relay Performance During Stable Power Swings**
2. **Number:** PRC-026-1
3. **Purpose:** To ensure that relays do not operate for non-Fault conditions during stable power swings.
4. **Applicability:**
 - 4.1. **Functional Entities:**
 - 4.1.1 Planning Coordinator
 - 4.1.2 Transmission Planner
 - 4.1.3 Transmission Owner that applies protective relays at the terminals of the Elements listed in Section 4.2, Facilities.
 - 4.1.4 Generator Owner that applies protective relays at the terminals of the Elements listed in Section 4.2, Facilities.
 - 4.2 **Facilities:**

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The following Bulk Electric System (BES) Elements:
 - 4.2.1 Transmission lines.
 - 4.2.2 Generating units.
 - 4.2.3 Transformers.
 - 4.2.4 Series reactors.

B. Requirements

- R1.** Each Planning Coordinator and Transmission Planner shall evaluate its portion of the Bulk Electric System (BES), once each calendar year, to identify Generation and Transmission Elements that meet any of the following criteria:

Criteria:

1. Elements located at or terminating at a generating plant, where a generating plant stability constraint is addressed by an operating limit or a Special Protection System (SPS) (including line-out conditions),
2. Elements that are associated with a System Operating Limit (SOL) that has been established based on stability constraints identified in system planning or operating studies (including line-out conditions).
3. Elements that have tripped due to power swings during system disturbances.

4. Elements that form a boundary of a potential island of the BES as identified by the Planning Coordinator or Transmission Planner that may form an island.
 5. Additional Elements that are identified as utilizing protective relays that are challenged by stable power swings in Planning Assessments (e.g., TPL-001-4).
- R2.** Each Planning Coordinator and Transmission Planner shall determine the stable power swing apparent impedance characteristics associated with each of the Elements identified in Requirement R1 based on the simulation of disturbances specified in Transmission System Planning Performance Requirements and according to the criteria in Attachment 1. *[Violation Risk Factor: Medium] [Time Horizon: Operations Planning, Long-term Planning]*
- R3.** Each Planning Coordinator and Transmission Planner shall provide the stable power swing apparent impedance characteristics determined in Requirement R2 to the Transmission Owner(s) and Generator Owner(s) that own a Protection System applied to a terminal of the associated Element. *[Violation Risk Factor: Medium] [Time Horizon: Operations Planning, Long-term Planning]*
- R4.** Each Transmission Owner and Generator Owner that receives apparent power swing impedance characteristics as a result of Requirement R3 shall, within three months: *[Violation Risk Factor: Medium] [Time Horizon: Operations Planning, Long-term Planning]*
- Show that the existing Protection Systems will not operate for the provided stable power swing characteristics, or
 - Revise its Protection System settings as necessary to prevent operating for the provided stable power swing characteristics, or
 - Develop a Corrective Action Plan to modify or replace Protection System components that operate for the provided stable power swing characteristics, or
 - Demonstrate that operation of the Protection System for a stable power swing is acceptable.

Need lead in to the basis of the standard (SPCS Report) so the following makes sense in terms of the changes/direction of the team.

Rationale 1: The System Protection and Control Subcommittee (SPCS) developed a set of criteria for the drafting team to consider while developing this standard. The drafting team agreed that those criteria were appropriate to include for evaluation as to which protective relays are likely to be challenged or to operate during stable power swings. The drafting team replaced “lines” with “Elements” as proposed in the SPCS report to more accurately include items, such as generators, lines, or transformers that may use protective relays that are subject to operation during stable power swings. The drafting team modified the fifth criterion to specifically include Elements that are identified as being challenged by stable power swings that occur during Planning Assessments since those assessments are already performed by Planning Coordinators and Transmission Planners pursuant to other standards.

The drafting team contends that the criteria should be evaluated annually as a part of the assessments that are performed.

Rationale 2: The drafting team asserts that power swing impedance characteristics resulting from simulated disturbances are necessary so that the likelihood of protective relays being challenged by stable power swings can be ascertained. The drafting team assigned the responsibility for developing those impedance characteristics to the Planning Coordinators and Transmission Planners because they maintain the models and tools that have the capability to develop the power swing impedance characteristics. The drafting team contends that three calendar months is sufficient time to develop the impedance swing characteristic after including the Element in Requirement R1.

Rationale 3: The drafting team recognizes that the Protection System owners need the power swing impedance characteristics so that the relay operating characteristics can be evaluated to determine if they will be challenged by the power swing. The drafting team assigned the responsibility for providing those power swing impedance characteristics to the Transmission Owners and Generator Owners that apply protective relays that might be challenged by stable power swings. The drafting team contends that one calendar month is an appropriate time frame to provide the power swing impedance characteristics to the appropriate protective relay owner(s).

Rationale 4: The drafting team recognizes that the protective relay owners will have the settings necessary for comparison to the power swing impedance characteristics. The drafting team assigned the responsibility to compare the power swing impedance characteristics and the protective relay operating characteristics to the Transmission Owners and Generator Owners that apply protective relays that might be challenged by stable power swings. The drafting team asserts that meeting one of the four outcomes in Requirement R4 assures that the reliability goal of this standard will be met. The drafting team contends that three calendar months is sufficient time to complete one of the four outcomes in Requirement R4.