

Table of Issues and Directives

Project 2010-13.3 – Relay Loadability: Stable Power Swings

Table of Issues and Directives Associated with PRC-026-1

| Source | Issue or Directive Language (including Para. #) | Section and/or Requirement(s) | Consideration of Issue or Directive |
|----------------|---|-------------------------------|--|
| FERC Order 733 | 150. We will not direct the ERO to modify PRC-023-1 to address stable power swings. However, because both NERC and the Task Force have identified undesirable relay operation due to stable power swings as a reliability issue, we direct the ERO to develop a Reliability Standard that requires the use of protective relay systems that can differentiate between faults and stable power swings and, when necessary, phases out protective relay systems that cannot meet this requirement. | All requirements | <p>The PRC-026-1 standard is responsive to this directive by using an equally effective and efficient focused approach for the Planning Coordinator to provide notification of BES Elements according to the Requirement R1 criteria to the respective Generator Owner and Transmission Owner. The criteria used to identify a BES Element are based on the NERC System Protection and Control Subcommittee technical document, <i>Protection System Response to Power Swings</i> (“PSRPS Report”).¹ The specific criteria are based on where power swings are expected to challenge load-responsive protective relays.</p> <p>The criteria include 1) Generator(s) where an angular stability constraint exists that is addressed by a System Operating Limit (SOL) or a Remedial Action Scheme (RAS) and those Elements</p> |

¹ NERC System Protection and Control Subcommittee technical document, *Protection System Response to Power Swings*, August 2013: http://www.nerc.com/comm/PC/System%20Protection%20and%20Control%20Subcommittee%20SPCS%2020/SPCS%20Power%20Swing%20Report_Final_20131015.pdf

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| <p>We also direct the ERO to file a report no later than 120 days of this Final Rule addressing the issue of protective relay operation due to power swings. The report should include an action plan and timeline that explains how and when the ERO intends to address this issue through its Reliability Standards development process.</p> <p>AND</p> <p>153. While we recognize that addressing stable power swings is a complex issue, we note that more than six years have passed since the August 2003 blackout and there is still no Reliability Standard that addresses relays tripping due to stable power swings. Additionally, NERC has long identified undesirable relay operation due to stable power swings as a reliability issue. Consequently, pursuant to section 215(d)(5) of the FPA, we find that undesirable relay operation due to stable power swings is a specific matter that the ERO must address to carry out the goals of section 215, and we direct the ERO to develop a Reliability Standard</p> | <p>terminating at the Transmission station associated with the generator(s); 2) An Element that is monitored as part of an SOL identified by the Planning Coordinator’s methodology based on an angular stability constraint; 3) An Element that forms the boundary of an island in the most recent underfrequency load shedding (UFLS) design assessment based on application of the Planning Coordinator’s criteria for identifying islands, only if the island is formed by tripping the Element based on angular instability; 4) An Element identified in the most recent annual Planning Assessment where relay tripping occurs due to a stable or unstable power swing during a simulated disturbance.</p> <p>Requirement R2 requires the Generator Owner and Transmission Owner to evaluate their load-responsive protective relays that are applied at all of the terminals of each BES Element identified by the Planning Coordinator in Requirement R1 or upon becoming aware of a generator, transformer, or transmission line BES Element that tripped in response to a stable or unstable power swing due to the operation of their protective relay(s). The initial evaluation allows the Generator Owner and Transmission Owner to determine whether their load-responsive protective relays applied at all of the terminals of the BES Element meet the PRC-026-1 – Attachment B criteria. Additionally, the Requirement ensures that the Generator Owner and Transmission Owner must re-evaluate the Protection System</p> |
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| | <p>addressing undesirable relay operation due to stable power swings.</p> | | <p>on a five year basis should the BES Element continue to be identified by the Planning Coordinator in Requirement R1.</p> <p>Requirement R3 mandates the development of a Corrective Action Plan (CAP) such that the Protection System of a BES Element will meet the PRC-026-1 –Attachment B criteria or the Protection System can be excluded under the PRC-026-1 – Attachment A criteria (e.g., modifying the Protection System so that relay functions are supervised by power swing blocking or using relay systems that are immune to power swings).</p> <p>Requirement R4 mandates that the Generator Owner and Transmission Owner implement each developed CAP in Requirement R3 so that load-responsive protective relays are expected to not trip in response to stable power swings during non-Fault conditions.</p> |
| | <p>162. The PSEG Companies also assert that the Commission’s approach to stable power swings should be inclusive and include “islanding” strategies in conjunction with out-of-step blocking or tripping requirements. We agree with the PSEG Companies and direct the ERO to consider “islanding” strategies that achieve the fundamental performance for all islands in developing the new</p> | <p>Requirement R1, Criterion 3</p> | <p>Islanding strategies were considered during the development of the proposed standard. It was determined that islanding strategies are not an appropriate method to meet the purpose of the proposed standard. Islanding strategies are developed to isolate the system from unstable power swings, which is not prohibited under the proposed standard. The proposed standard’s intent is to ensure that load-responsive protective relays are expected to not trip in response to stable power swings during non-Fault conditions, while maintaining dependable fault detection and dependable out-of-step</p> |

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| | Reliability Standard addressing stable power swings. | | tripping (if out-of-step tripping is applied at the terminal of the BES Element). |
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