

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	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. The criteria include 1) Generator(s) where an angular stability constraint exists that is addressed by a

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

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
	<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</p>		<p>System Operating Limit (SOL) or a Remedial Action Scheme (RAS) and those Elements terminating at the Transmission station associated with the generator(s); 2) An Element that is monitored as part of a 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, where 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 its 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</p>

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
	<p>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 addressing undesirable relay operation due to stable power swings.</p>		<p>transmission line BES Element that tripped in response to a stable or unstable power swing due to the operation of its protective relay(s). The initial evaluation allows the Generator Owner and Transmission Owner to determine whether its 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 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 to exclude the Protection System 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>

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
			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>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 Reliability Standard addressing stable power swings.</p>	Requirement R1, Criterion 3 and Requirement R2, Criterion 2.	<p>Islanding strategies were considered during the development of the proposed standard. It was determined that consideration of islanding strategies does not comport with the purpose and approach 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 purpose is to ensure that load-responsive protective relays are expected to not trip in response to stable power swings during non-Fault conditions, not to determine where the BES Elements should form island boundaries.</p> <p>With respect to considering the islanding concern, the proposed standard does require that a BES</p>

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
			<p>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, where the island is formed by tripping the Element based on angular instability.</p> <p>Any identified BES Element(s) require the Generator Owner and Transmission Owner to determine whether its load-responsive protective relays, if any, applied at the terminals of such an Element are susceptible to tripping in response to a stable power swing. If so, the Generator Owner and Transmission Owner are required to take specific action according to the Requirements to reduce the risk that any load-responsive protective relay would trip in response to stable power swings during non-Fault conditions.</p>