

**PRC-023-2 Mapping of Requirements from PRC-023-1 and  
Directed Modifications in Order No. 733**

| <b>Mapping of PRC-023-1 to PRC-023-2</b>   |  |  |                               |
|--|--|--|-------------------------------|
| <b>Requirement in the Existing PRC-023-1</b>   | <b>Location in PRC-023-2 (1<sup>st</sup> Posting)</b>                              | <b>Location in PRC-023-2 (2<sup>nd</sup> Posting)</b>                              | <b>Needed for Reliability</b> |
| <p><b>R1.</b> Each Transmission Owner, Generator Owner, and Distribution Provider shall use any one of the following criteria (R1.1 through R1.13) for any specific circuit terminal to prevent its phase protective relay settings from limiting transmission system loadability while maintaining reliable protection of the Bulk Electric System for all fault conditions. Each Transmission Owner, Generator Owner, and Distribution Provider shall evaluate relay loadability at 0.85 per unit voltage and a power factor angle of 30 degrees:</p>  | Requirement R1   | Requirement R1   | Yes                           |
| <p><b>R1.1.</b> Set transmission line relays so they do not operate at or below 150% of the highest seasonal Facility Rating of a circuit, for the available defined loading duration nearest 4 hours (expressed in amperes).<br/> <b>R1.2.</b> Set transmission line relays so they do not operate at or below 115% of the highest seasonal 15-minute Facility Rating<sup>2</sup> of a circuit (expressed in amperes).<br/> <b>R1.3.</b> Set transmission line relays so they do not operate at or below 115% of the maximum theoretical power transfer capability (using a 90-degree angle between the sending end and receiving-end voltages and either reactance or complex impedance) of the circuit (expressed in amperes) using one of the following to perform the power transfer calculation:<br/> <b>R1.3.1.</b> An infinite source (zero source impedance) with a 1.00 per unit bus voltage at each end of the line.<br/> <b>R1.3.2.</b> An impedance at each end of the line, which reflects the actual system source impedance with a 1.05 per unit voltage behind each source impedance.<br/> <b>R1.4.</b> Set transmission line relays on series compensated transmission lines so they do not operate at or below the maximum power transfer capability of the line, determined as the greater of:<br/> - 115% of the highest emergency rating of the series capacitor.<br/> - 115% of the maximum power transfer capability of the circuit (expressed in amperes), calculated in accordance</p> | Requirements R1.1 through R1.13 are now criteria 1 through 13 under Requirement R1 | Requirements R1.1 through R1.13 are now criteria 1 through 13 under Requirement R1 | Yes                           |

| Mapping of PRC-023-1 to PRC-023-2  |   |   |                        |
|--|---|---|------------------------|
| Requirement in the Existing PRC-023-1  | Location in PRC-023-2 (1 <sup>st</sup> Posting) | Location in PRC-023-2 (2 <sup>nd</sup> Posting) | Needed for Reliability |
| <p>with R1.3, using the full line inductive reactance.</p> <p><b>R1.5.</b> Set transmission line relays on weak source systems so they do not operate at or below 170% of the maximum end-of-line three-phase fault magnitude (expressed in amperes).</p> <p><b>R1.6.</b> Set transmission line relays applied on transmission lines connected to generation stations remote to load so they do not operate at or below 230% of the aggregated generation nameplate capability.</p> <p><b>R1.7.</b> Set transmission line relays applied at the load center terminal, remote from generation stations, so they do not operate at or below 115% of the maximum current flow from the load to the generation source under any system configuration.</p> <p><b>R1.8.</b> Set transmission line relays applied on the bulk system-end of transmission lines that serve load remote to the system so they do not operate at or below 115% of the maximum current flow from the system to the load under any system configuration.</p> <p><b>R1.9.</b> Set transmission line relays applied on the load-end of transmission lines that serve load remote to the bulk system so they do not operate at or below 115% of the maximum current flow from the load to the system under any system configuration.</p> <p><b>R1.10.</b> Set transformer fault protection relays and transmission line relays on transmission lines terminated only with a transformer so that they do not operate at or below the greater of:</p> <ul style="list-style-type: none"> <li>- 150% of the applicable maximum transformer nameplate rating (expressed in amperes), including the forced cooled ratings corresponding to all installed supplemental cooling equipment.</li> <li>- 115% of the highest operator established emergency transformer rating.</li> </ul> <p><b>R1.11.</b> For transformer overload protection relays that do not comply with R1.10 set the relays according to one of the following:</p> <ul style="list-style-type: none"> <li>- Set the relays to allow the transformer to be operated at an overload level of at least 150% of the maximum applicable nameplate rating, or 115% of the highest operator established emergency transformer rating, whichever is greater. The protection must allow this overload for at least 15 minutes to allow for the operator</li> </ul> |   |   |                        |

| Mapping of PRC-023-1 to PRC-023-2   |   |   |                        |
|---|---|---|------------------------|
| Requirement in the Existing PRC-023-1   | Location in PRC-023-2 (1 <sup>st</sup> Posting) | Location in PRC-023-2 (2 <sup>nd</sup> Posting) | Needed for Reliability |
| <p>to take controlled action to relieve the overload.<br/>                     - Install supervision for the relays using either a top oil or simulated winding hot spot temperature element. The setting should be no less than 100° C for the top oil or 140° C for the winding hot spot temperature<sup>3</sup>.</p> <p><b>R1.12.</b> When the desired transmission line capability is limited by the requirement to adequately protect the transmission line, set the transmission line distance relays to a maximum of 125% of the apparent impedance (at the impedance angle of the transmission line) subject to the following constraints:</p> <p><b>R1.12.1.</b> Set the maximum torque angle (MTA) to 90 degrees or the highest supported by the manufacturer.</p> <p><b>R1.12.2.</b> Evaluate the relay loadability in amperes at the relay trip point at 0.85 per unit voltage and a power factor angle of 30 degrees.</p> <p><b>R1.12.3.</b> Include a relay setting component of 87% of the current calculated in R1.12.2 in the Facility Rating determination for the circuit.</p> <p><b>R1.13.</b> Where other situations present practical limitations on circuit capability, set the phase protection relays so they do not operate at or below 115% of such limitations.</p> |   |   |                        |
| <p><b>R2.</b> The Transmission Owner, Generator Owner, or Distribution Provider that uses a circuit capability with the practical limitations described in R1.6, R1.7, R1.8, R1.9, R1.12, or R1.13 shall use the calculated circuit capability as the Facility Rating of the circuit and shall obtain the agreement of the Planning Coordinator, Transmission Operator, and Reliability Coordinator with the calculated circuit capability.</p>   | Requirement R3                                  | Requirement R3                                  | Yes                    |
| <p><b>R3.</b> The Planning Coordinator shall determine which of the facilities (transmission lines operated at 100 kV to 200 kV and transformers with low voltage terminals connected at 100 kV to 200 kV) in its Planning Coordinator Area are critical to the reliability of the Bulk Electric System to identify the facilities from 100 kV to 200 kV that must meet Requirement 1 to prevent potential cascade tripping that may occur when protective relay settings limit transmission loadability.</p>   | Requirement R6                                  | Requirement R6                                  | Yes                    |

| Mapping of PRC-023-1 to PRC-023-2   |  |  |                        |
|---|--|--|------------------------|
| Requirement in the Existing PRC-023-1   | Location in PRC-023-2 (1 <sup>st</sup> Posting)  | Location in PRC-023-2 (2 <sup>nd</sup> Posting)  | Needed for Reliability |
| <p><b>R3.1.</b> The Planning Coordinator shall have a process to determine the facilities that are critical to the reliability of the Bulk Electric System.</p> <p><b>R3.1.1.</b> This process shall consider input from adjoining Planning Coordinators and affected Reliability Coordinators.</p> | Determination of facilities that must comply with this standard is now contained in Attachment B | Determination of facilities that must comply with this standard is now contained in Attachment B | Yes                    |
| <p><b>R3.2.</b> The Planning Coordinator shall maintain a current list of facilities determined according to the process described in R3.1.</p>   | Requirement R6, Part 6.3   | Requirement R6, Part 6.1   | Yes                    |
| <p><b>R3.3.</b> The Planning Coordinator shall provide a list of facilities to its Reliability Coordinators, Transmission Owners, Generator Owners, and Distribution Providers within 30 days of the establishment of the initial list and within 30 days of any changes to the list.</p>           | Requirement R6, Part 6.5   | Requirement R6, Part 6.2   | Yes                    |

| Mapping of Directed Changes in Order No. 733 |   |   |   |                        |
|--|---|---|---|------------------------|
| Paragraph in Order No. 733                   | Text  | Location in PRC-023-2 (1 <sup>st</sup> Draft) | Location in PRC-023-2 (2 <sup>nd</sup> Draft) | Needed for Reliability |
| 60   | With respect to sub-100 kV facilities, we adopt the NOPR proposal and direct the ERO to modify PRC-023-1 to apply an “add in” approach to sub-100 kV facilities that are owned or operated by currently-Registered Entities or entities that become Registered Entities in the future, and are associated with a facility that is included on a critical facilities list defined by the Regional Entity. We also direct that additions to the Regional Entities’ critical facility list be tested for their applicability to PRC-023-1 and made subject to the Reliability Standard as appropriate. | Requirement R6 and Attachment B               | Requirement R6 and Attachment B               | Yes                    |
| 69   | Finally, pursuant to section 215(d)(5) of the FPA, we   | Requirement                                   | Requirement                                   | Yes                    |

| Mapping of Directed Changes in Order No. 733 |  |   |   |                        |
|--|--|---|---|------------------------|
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|  | direct the ERO to modify Requirement R3 of the Reliability Standard to specify the test that planning coordinators must use to determine whether a sub-200 kV facility is critical to the reliability of the Bulk-Power System. We direct the ERO to file its test, and the results of applying the test to a representative sample of utilities from each of the three Interconnections, for Commission approval no later than one year from the date of this Final Rule. | R6 and Attachment B   | R6 and Attachment B   |                        |
| 97   | Finally, commenters argue that there should be some mechanism for entities to challenge criticality determinations. We agree that such a mechanism is appropriate and direct the ERO to develop an appeals process (or point to a process in its existing procedures) and submit it to the Commission no later than one year after the date of this Final Rule.  | To be addressed outside PRC-023-2                                   | To be addressed outside PRC-023-2                                   | Yes                    |
| 162  | 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.   | Considered in Phase I; will be addressed in Phase III               | Considered in Phase I; will be addressed in Phase III               | Yes                    |
| 186  | However, we will adopt the NOPR proposal to direct the ERO to modify PRC-023-1 to require that transmission owners, generator owners, and distribution providers give their transmission operators a list of transmission facilities that implement sub-requirement R1.2.  | Requirement R4  | Requirement R4  | Yes                    |
| 203  | We adopt the NOPR proposal and direct the ERO to modify sub-requirement R1.10 so that it requires entities to verify that the limiting piece of equipment is capable of sustaining the anticipated overload for the longest clearing time associated with the fault.   | Requirement R1, criterion 10  | Requirement R1, criterion 10  | Yes                    |
| 224  | While we are not adopting the NOPR proposal, we direct the ERO to document, subject to audit by the Commission, and to make available for review to users, owners and operators of the Bulk-Power System, by request, a list of those facilities that have protective relays set pursuant sub-requirement R1.12.   | Requirement R5 collects data; ERO to provide list outside PRC-023-2 | Requirement R5 collects data; ERO to provide list outside PRC-023-2 | Yes                    |

| Mapping of Directed Changes in Order No. 733 |  |   |   |                        |
|--|--|---|---|------------------------|
| Paragraph in Order No. 733                   | Text   | Location in PRC-023-2 (1 <sup>st</sup> Draft)         | Location in PRC-023-2 (2 <sup>nd</sup> Draft)         | Needed for Reliability |
| 237  | We adopt the NOPR proposal and direct the ERO to modify the Reliability Standard to add the Regional Entity to the list of entities that receive the critical facilities list. [sub-requirement R3.3]  | Requirement R6, Part 6.5                              | Requirement R6, Part 6.2                              | Yes                    |
| 244  | We adopt the NOPR proposal and direct the ERO to include section 2 of Attachment A in the modified Reliability Standard as an additional Requirement with the appropriate violation risk factor and violation severity level.  | Requirement R2  | Requirement R2  | Yes                    |
| 264  | After further consideration, and in light of the comments, we will not direct the ERO to remove any exclusion from section 3, except for the exclusion of supervising relay elements in section 3.1. Consequently, we direct the ERO to revise section 1 of Attachment A to include supervising relay elements on the list of relays and protection systems that are specifically subject to the Reliability Standard. | Attachment A, Section 1.6                             | Attachment A, Section 1.6                             | Yes                    |
| 283  | Additionally, in light of our directive to the ERO to expand the Reliability Standard's scope to include sub-100 kV facilities that Regional Entities have already identified as necessary to the reliability of the Bulk-Power System through inclusion in the Compliance Registry, we direct the ERO to modify the Reliability Standard to include an implementation plan for sub-100 kV facilities.                 | Implementation Plan                                   | Implementation Plan                                   | Yes                    |
| 284  | We also direct the ERO to remove the exceptions footnote from the "Effective Dates" section.   | Footnote 1 removed from the "Effective Dates" section | Footnote 1 removed from the "Effective Dates" section | Yes                    |