

IB.4—Reliability Criteria for System Planning

1. Scope

The design of PacifiCorp's electrical system is intended to meet the reliability performance requirements of all North American Electric Reliability Corporation (NERC), Western Electricity Coordinating Council (WECC), and PacifiCorp standards and criteria. This document discusses the specific standards and criteria, and how they apply to PacifiCorp's system.

2. References and Resource Documents

The latest revisions of the following industry documents in effect on the date of this document apply to the extent specified herein. The "TPL" and "FAC" documents listed below are included as attachments at the end of this document, as of this document's date of publication. Planners and other users can use the web links provided below to check for current versions of reference documents.

WECC Regional Performance Criterion, [TPL-001-WECC-CRT-3](#), *Transmission System Planning Performance*, current version (Attachment 1)

NERC [TPL Transmission System Planning Performance Requirements](#) (TPL-001-4) current versions (Attachment 2)

NERC *System Operating Limits Methodology for the Planning Horizon* ([FAC-010](#)), current version (Attachment 3)

NERC *Facility Rating Methodology*, ([FAC 008-3](#)) Standard (Attachment 4)

ANSI / IEEE SA [C57.92-1981](#), *IEEE Guide for Loading Mineral-Oil-Immersed Power Transformers up to and Including 100 MVA, with 55 Degrees C or 65 Degrees C Average Winding Rise*

ANSI / IEEE SA [C57.115-1991](#), *IEEE Guide for Loading Mineral-Oil-Immersed Power Transformers Rated in Excess of 100 MVA (65 Degrees C Winding Rise)*

WECC and NERC Modeling, Data and Analysis ([MOD](#)) Standards

NERC [Glossary of Terms](#) *Definition of Bulk Electric System*

WECC [Glossary of Terms](#)

The latest revisions of the following PacifiCorp documents in effect on the date of this document apply to the extent specified herein.

PacifiCorp Engineering Handbook [1B.3](#), *Planning Standards for Transmission Voltage* "[1B.3 Planning Standards for Transmission Voltage](#)" on page 1

PacifiCorp Engineering Handbook [1B.9](#), *Substation Design Criteria*

PacifiCorp's Open Access Transmission Tariff ([OATT](#))

PacifiCorp's [Network Diagram](#)

NERC standards and WECC criteria apply to Bulk Electric System (BES) elements. PacifiCorp's BES is highlighted on the network diagram in blue except the BES that is part of a major WECC path which is highlighted in yellow.

3. Definitions

The NERC Reliability Standards' glossary provides the following definitions:

3.1. Bulk Electric System (BES) Transmission:

Unless modified by the lists shown below, the BES is all transmission elements operated at 100 kV or higher, and real power and reactive power resources connected at 100 kV or higher. This does not include facilities used in the local distribution of electric energy.

- Inclusions:
 1. Transformers with the primary terminal and at least one secondary terminal operated at 100 kV or higher unless excluded under exclusion #1 or #3 (below)
 2. Generating resource(s) with gross individual nameplate rating greater than 20 MVA or gross plant/facility aggregate nameplate rating greater than 75 MVA including the generator terminals through the high-side of the step-up transformer(s) connected at a voltage of 100 kV or above
 3. Blackstart resources identified in the transmission operator's restoration plan
 4. Dispersed power producing resources with aggregate capacity greater than 75 MVA (gross aggregate nameplate rating) utilizing a system designed primarily for aggregating capacity, connected at a common point at a voltage of 100 kV or above
 5. Static or dynamic devices (excluding generators) dedicated to supplying or absorbing reactive power that are connected at 100 kV or higher, or through a dedicated transformer with a high-side voltage of 100 kV or higher, or through a designated transformer

4. BES Transmission, Non-BES Transmission and Distribution

4.1. BES Transmission Requirements

NERC TPL-001-4 Table 1, *Steady State & Stability Performance Planning Events*, provides performance standards required for the BES for a wide variety of conditions. The planning coordinator and the transmission planner are required to annually demonstrate, through a valid assessment, that its portion of the interconnected transmission system is planned such that facilities can be operated to supply projected customer demands and projected firm (non-recallable reserved) transmission services, at all demand levels over the range of forecast demand, under the contingency conditions defined in the appropriate category of NERC TPL-001-4 Table 1. Planning shall also be consistent with the current revision of PacifiCorp's Open Access Transmission Tariff, Attachment C, *Methodology to Assess Available Transfer Capability*.

Additional requirements are provided in NERC FAC-010 (including Section E), and, within the WECC region, criterion for acceptable impacts to systems owned and/or operated by other

entities is provided in TPL-001-WECC-CRT-3. This regional performance criterion document also defines the voltage stability, post-transient voltage deviation, and other requirements applicable to transmission path rating studies.

System topologies and models used in planning studies and assessments shall be maintained in accordance with WECC and NERC MOD standards and requirements, and NERC FAC-008.

4.1.1. For all categories for both steady state and stability the following shall be met:

- a. The system shall remain stable. Cascading and uncontrolled islanding shall not occur.
- b. Consequential load loss as well as generation loss is acceptable as a consequence of an event excluding category P0 (see Table 1).
- c. Simulate the removal of all elements that protection systems and other controls are expected to automatically disconnect for each event.
- d. Simulate normal clearing unless otherwise specified.
- e. Planned system adjustments such as transmission configuration changes and re-dispatch of generation are allowed if such adjustments are executable within the time duration applicable to the facility ratings.

5. Power Transformer Loading Criteria

The goal of power transformer loading criteria is to define planning and design criteria, which provides loading limits for transformers in transmission and distribution substations under typical summer and winter conditions. Questions concerning specific guidelines for existing transformers and their auxiliary equipment should be referred to substation engineering and area planning.

This material specification shall be used and duplicated only in support of PacifiCorp projects.

[Appendix A - WECC Criterion – TPL-001-WECC-CRT-3](#)

[Appendix B - Standard TPL-001-4 — Transmission System Planning Performance Requirements](#)

[Appendix C Standard FAC-010-3 — System Operating Limits Methodology for the Planning Horizon](#)

[Appendix D - Standard FAC-008-3 Facility Ratings](#)

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