

Facility Interconnection Requirements and Study Procedures



Facility Interconnection Requirements and Study Procedures

NERC Reliability Standards

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FAC-002-2

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Facility Interconnection Requirements and Study Procedures

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Facility Interconnection Requirements and Study Procedures

1.0 INTRODUCTION

This procedure shall ensure Tri-State Generation and Transmission Association, Inc.'s (Tri-State) compliance with North American Electric Reliability Corporation (NERC) Reliability Standards that address Facility Interconnection requirements and Study procedures. These standards address interconnection requirements and study procedures for new or materially modified Generation facilities, Transmission facilities, and End-user facilities. Tri-State's Facility Interconnection Requirements and Study Procedures are designed to ensure compliance with applicable NERC and Western Electricity Coordinating Council (WECC) Regional Reliability Standard Requirements.

The following NERC Reliability Standards are addressed by this procedure:

Standard	Title
FAC-001-2	Facility Interconnection Requirements
FAC-002-2	Facility Interconnection Studies

Tri-State is a wholesale electric power producer and transmission provider serving the needs of its member rural electric cooperatives and participating in regional wholesale electricity markets. Tri-State's Bulk Electric System consists of facilities energized at 345kV, 230kV, 138kV, 115kV and is owned, maintained and operated to provide wholesale power deliveries to Tri-State's member and non-member network service customers.

This document explains the procedures to follow when requesting an interconnection with the Tri-State transmission system. It is intended to be a guide for the prompt processing of interconnection requests. It should be noted that an *interconnection* with Tri-State's transmission system does not guarantee *transmission* service or capacity on Tri-State's system.

All interconnection customers shall comply with all applicable NERC Reliability Standard Requirements mandated by FERC, pursuant to Section 215 of the Federal Power Act.¹ Any entity seeking to connect Generation, Transmission, and/or End-user facilities to the Tri-State electric system shall be required to meet the system performance standards as described and referenced herein throughout the planning horizon.

These requirements shall be the minimum requirements necessary for processing interconnection requests. There may be additional requirements depending on the location characteristics, or planned usage of the proposed interconnection facility and those requirements shall be addressed on a case by case basis.

¹ FAC-002-2_R1.2

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2.0 RESPONSIBILITIES

Tri-State has designated two roles for administration and management of the interconnection request and study processes, namely the Interconnection Manager (IM) and the Interconnection Administrator (IA). Both positions are designated and supervised by the Senior Manager for Transmission Planning.

The IA's role is the point of contact regarding the requests for interconnection and material modifications regarding existing interconnections. The IA is responsible for logistics and communication between Tri-State and interconnecting entities for new interconnections and shall coordinate study efforts required for new interconnections and materially modified existing interconnections, as needed. The IA shall also be responsible for archiving documentation and evidence to a location designated by the IM.

The IM's role is the management of the processes for new interconnections and material modifications to existing interconnections. The IM is responsible for ensuring that all interconnection requirements are met. The IM shall also be responsible for the management and delegation of Transmission Planning Engineer work in performing studies, and/or the coordination and cooperation on studies with other entities pursuant to FAC-002-2.

3.0 INTERCONNECTION REQUIREMENTS AND STUDY PROCEDURES FOR GENERATION, TRANSMISSION, AND END-USER FACILITIES²

All requests for interconnection to the Tri-State transmission system shall be consistent with NERC, WECC and Tri-State reliability requirements and standard utility practices. A proposed interconnection or modification of an existing interconnection for Generation, Transmission, or End-user facilities shall not degrade the reliability or operating flexibility of the existing transmission system.

All arrangements for system studies, engineering design, construction, ownership, operations, maintenance, replacement equipment, metering, facility controls, and telecommunications shall be set forth in written contracts between Tri-State and the requesting party.

The costs associated with facility connections and all associated Network Upgrades as identified in applicable studies shall be the responsibility of the requesting party unless otherwise defined in Tri-State's OATT. Tri-State reserves the right to participate in the costs and ownership of proposed facility expansions that result in mutually advantageous alternatives or which provide benefits to regional reliability or transmission transfer capability. All costs associated with environmental activities for new facilities shall be the responsibility of the requesting party. Advance funds or deposits may be required by Tri-State prior to any work being performed.

² FAC-001-2_R1

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A direct interconnection with Tri-State's transmission system does not guarantee transmission service. Requests for transmission service shall be made in accordance with Tri-State's Open Access Transmission Tariff (OATT). Tri-State is a listed Transmission Provider on the Open Access Same-Time Information System (OASIS) administered by Open Access Technology International, Inc., (OATI). Any customer desiring to purchase transmission services from Tri-State shall do so through the OASIS site at <http://www.oatioasis.com/tsgt>.

The following requirements and procedures shall be satisfied by any entity seeking to connect Generation, Transmission, and/or End-user facilities to the Tri-State electric system. The IM, and/or the IM's designee, shall manage the interconnection process, through the IA as the point of contact, through all the following steps.

3.1. Procedures for Coordinated Joint Studies

- 3.1.1. Entities seeking to connect Generation, Transmission, or End-user facilities shall work cooperatively with Tri-State in conducting studies of the new facilities and their impacts on the interconnected transmission system. Generation Interconnection Studies, Transmission Interconnection Studies, and End-User Interconnection Studies shall be performed in accordance with Tri-State's OATT.
- 3.1.2. A System Impact Study shall be required to evaluate the electrical system performance of the transmission system with the requested facility connection (and alternatives) and to demonstrate adherence to established reliability criteria, including applicable NERC, WECC and SPP Reliability Standards, Tri-State criteria and these Facility Interconnection Requirements.³
- 3.1.3. After acceptable completion of the System Impact Study, a Facilities Study shall be required to determine the detailed facility interconnection requirements. The Facilities Study shall identify direct assignment facilities, network upgrades, cost estimates, and typical construction requirements. All costs to conduct or review System Impact studies and Facility studies are the responsibility of the requesting party. Assumptions used in the performance of the studies shall be coordinated with entities and determined on a case-by-case basis and documented within the study reports.⁴
- 3.1.4. Studies evaluating the impacts of new or modified Generation, Transmission, or End-user facilities shall be conducted utilizing analytical tools and databases approved or deemed acceptable by Tri-State and

³ FAC-002-2_R1.2

⁴ FAC-002-2_R1.4

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WECC.

- 3.1.5. The scope of studies to be conducted may include, but shall not be limited to, steady-state power flow analysis, post-transient analysis, dynamic stability analysis, Electro-Magnetic Transients Program (EMTP) analysis, and short-circuit analysis to ensure compliance with all applicable NERC, WECC and Tri-State standards and requirements. All studies shall include normal and contingency conditions.⁵ Such study scope shall be as mutually agreed upon by the IM and the entity seeking to connect Generation, Transmission, or End-user facilities.
- 3.1.6. Evaluation of alternatives to the requested facility connection, such as lower voltage construction, alternative interconnection points, or upgraded facilities, may be required by the IM.
- 3.1.7. A list of alternative interconnection points or upgrades considered and the reasoning for the selection of the recommended alternative shall be documented in the interconnection study report.⁶
- 3.1.8. If no alternatives for interconnection points or upgrades are studied, the reason for not considering alternatives shall be documented in the interconnection study report.⁷
- 3.1.9. Steady-state power flow analysis shall require load and resource growth projections as applicable. MW and MVAR capacity and demand at the point of interconnection and voltage level are required. If the studies indicate that additions or upgrades to the existing transmission system are necessary, The IM, or the IM's designee, shall conduct or review facilities studies, at the expense of the requesting entity, to determine the cost of additions or upgrades and the required timeframe for implementing system additions or upgrades.
- 3.1.10. The transmission planning process for a proposed new facility connection shall also include coordinated joint studies with internal and external entities, if necessary. As applicable, the IM, and/or the IM's designee, shall adhere to its executed participation agreements with the sub-regional planning groups (CCPG, SWAT and WestConnect) which require and provide for the coordination of joint studies.⁸
- 3.1.11. The IM, and/or the IM's designee, shall ensure that the Interconnecting Customer's new or materially modified existing interconnections are within a Balancing Authority Area's metered boundary.

⁵ FAC-002-2_R1.3

⁶ FAC-002-2_R1.4

⁷ FAC-002-2 - R1.4

⁸ FAC-002-2 – R2, R3, R4, R5

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- 3.1.12. Copies of email correspondence between the IA and System Planning, or other external planning entities shall be archived if it relates to coordination of new or modified transmission or generation facilities.
- 3.1.13. In all interconnection studies, the IM, and/or the IM's designee, shall monitor neighboring systems for criteria violations, such as overloads or voltage criteria violations, to determine if the proposed facilities result in any impacts on neighboring systems. All interconnection reports should document the impacts on neighboring systems or document that no such impacts were identified.⁹ Any potentially affected systems will be given the opportunity to participate in the studies.
- 3.1.14. The Interconnection Customer shall be responsible for resolving any impacts on affected entities prior to interconnection.
- 3.1.15. The IM, and/or the IM's designee, that performs the interconnection study shall be responsible for notifying any affected entities that are identified in the study report.¹⁰

Results of all coordinated joint studies shall be documented along with any conclusions and recommendations. Such documentation shall be retained by the IA and shall be made available if requested by NERC, WECC, or any other entities responsible for the reliability of the interconnected transmission system as prescribed within forty-five business days.

3.2. Procedures for Notification of New or Materially Modified Interconnections

- 3.2.1. The IM shall be responsible for the dissemination of notifications for new or modified interconnections, as appropriate, to the Planning Authorities, WECC, MRO and NERC as soon as feasible and in accordance with notification procedures that such entities have established. For example, Tri-State updates certain Planning Authorities at regular quarterly meetings. The IM, or the IM's designee, shall coordinate interconnection additions and modifications, through the IA, with the following Planning Authorities:

Basin Electric Power Cooperative (BEPC)
Black Hills Corporation (Black Hills)
Colorado Springs Utilities (CSU)
El Paso Electric Company (EPE)
PacifiCorp (PAC)

⁹ FAC-001-2 - R3.1, R4.1

¹⁰ FAC-001-2, R3.2, R4.2; FAC-002-2, R1.1

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Platte River Power Authority (PRPA)
Public Service Company of New Mexico (PNM)
Southwest Power Pool, Inc. (SPP)
Western Area Power Administration (WAPA)
Xcel Energy (PSCO)

Tri-State procedures for notification of all new or modified member (End-User) facilities are documented in Tri-State Administrative Policy P-1, Member Delivery Point Application Policy.

3.3. Procedures for Requesting Interconnections

3.3.1. End-User Facilities

Tri-State does not sell power at retail to end-use customers. Therefore, any request for power delivery by an End-User shall be made to the appropriate Tri-State member system which shall then coordinate interconnection service with the IM. Facility Connection Requirements for End-User facilities are published in the following Tri-State Board of Directors documents: Policy 109, Member Service Policy and Policy 110, Transmission Extension Policy.

3.3.2. Generator Facilities

A Generator Interconnection customer shall apply for interconnection with Tri-State under the terms and conditions specified in the Generator Interconnection Procedures (GIP) of Tri-State's Tariff. The customer shall view and download the requirements of the GIP by going to Tri-State's Tariff as posted at the OASIS site <http://www.oatiaoasis.com/tsgt>. Attachment K of the Tariff contains the GIP and Appendix 1 to the GIP contains the forms for making the interconnection request.

To initiate the Generator Interconnection Request, the GIP requires the customer to submit a deposit to be applied toward the interconnection studies, complete an application for interconnection in the form of Appendix 1 of the GIP, and sign a Confidentiality Agreement (NDA) in the form of Appendix 2 of the GIP. The IM, or the IM's designee, shall maintain a list of all Generator Interconnection Requests and shall assign a queue position based upon the date and time of receipt of the request. If the request is determined by the IM, or the IM's designee, to be complete, that queue position shall be maintained for the customer. The customer may withdraw its request at any time by written notice of such withdrawal to the IM.

After receipt of a valid interconnection request, the IM, or the IM's designee, shall arrange a scoping meeting/call through the IA with the

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customer to exchange technical data and discuss alternatives. The IM, or the IM's designee, shall provide to the customer an Interconnection System Impact Study Agreement in the form of Appendix 3 to the GIP. The Interconnection System Impact Study shall consist of a short circuit analysis, a stability analysis, and a power flow analysis as necessary. EMTP studies may also be required. The Interconnection System Impact Study shall provide a list of facilities that are required as a result of the interconnection request and a non-binding good faith estimate of cost responsibility and a non-binding good faith estimate of time to construct.

Upon completion of the Interconnection System Impact Study, the customer shall supply additional deposits, letters of credit, and other data as specified in the GIP. Upon receipt of these documents, the IM, or the IM's designee, shall provide to the customer an Interconnection Facilities Study Agreement in the form of Appendix 4 to the GIP. The Interconnection Facilities Study shall specify and estimate the cost of the equipment, engineering, procurement and construction work needed to implement the conclusions of the Interconnection System Impact Study. The Interconnection Facilities Study shall also identify the electrical switching configuration of the connection equipment, including the transformer and switchgear. It shall identify any network upgrades necessary to accomplish the interconnection and their estimated cost and shall include an estimate of the time required to complete the construction and installation of such facilities.

The IA shall tender a standard Generator Interconnection Agreement (GIA) to the customer in the form of Appendix 5 to the GIP. The GIA shall include provisions for the engineering, procurement, construction and operation of the interconnection facilities.

Tri-State may interconnect with, purchase from or provide transmission service to certain small generator facilities as set forth in Tri-State Board of Directors Policy No. 101, Policy For Purchase Of Capacity And Energy From Small Generation Sources Using Renewable Energy Resources. If the customer desires to sell capacity and energy to a third party, Tri-State shall provide transmission service under the terms and conditions of Tri-State's OATT.

Each request to interconnect a small generator facility shall be evaluated on a case by case basis. If the customer's facilities will physically connect to Tri-State's facilities, the customer shall submit an application to the IM for interconnection. If the proposed interconnection is with Tri-State member facilities, the IM shall coordinate the request with the customer and the appropriate Tri-State member distribution system. Developers are encouraged to contact the Tri-State member system directly for basic information regarding interconnection. Detailed interconnection studies

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and power purchase agreements generally shall involve both the member and Tri-State.

The application shall include detailed design information, operating characteristics and equipment specifications. The customer must be able to demonstrate that all licenses and permits for the facility have been obtained and that site control has been secured. After initial contact, the IA shall arrange a meeting with the customer and include the appropriate Tri-State member to discuss the proposed interconnection and facilities.

The IM, or the IM's designee, shall ensure that the Interconnecting Customer's new or materially modified existing interconnections are within a Balancing Authority Area's metered boundary.

The proposed interconnection shall meet all applicable national, state and local construction and safety codes. The installation shall comply with the applicable sections of the National Electrical Safety Code (NESC) and the National Electrical Code (NEC). Tri-State, as an affected party, shall conduct any studies required to determine the reliability impact of the proposed interconnection on the transmission system. Such studies shall be conducted by the IM or the IM's designee. Assumptions used in the performance of the studies shall be coordinated with the customer and affected systems, if applicable, and determined on a case-by-case basis and documented within the studies. Depending on the size of the generation, the IM, or the IM's designee, shall determine if it is necessary to perform a System Impact Study or a Facilities Study. If any particular study is required, the scope and cost of the study shall be agreed upon in the appropriate study agreement. The customer shall be responsible for all study costs.

The IM, and/or the IM's designee, shall verify that the generator facility meets the interconnection requirements of Tri-State and Tri-State's member distribution system, including all standards concerning protective equipment, inspection, maintenance, insurance, metering and liability.

3.3.3 Transmission System Facility Connections

An applicant requesting transmission interconnection with Tri-State's BES shall be registered with, or in the process of registering with NERC <http://www.nerc.com/>. After initial contact, the IA shall provide interconnection related information, including any applicable interconnection standards or design criteria. An applicant desiring interconnection shall then submit a formal request to the IA.

After receiving the request, the IM, and/or the IM's designee, shall conduct a System Impact Study that shall assess the capability of and the reliability impact to the transmission system to support the requested interconnection. The study shall use Tri-State's Engineering Standards

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Bulletin, Reliability Criteria for System Planning and Service Standards and shall comply with the requirements of NERC and WECC. Upon completion of the System Impact Study, the IM, or the IM's designee, shall determine if additional studies, such as a Facilities Study or EMTP study, are required. The applicant shall be responsible for all study costs. Assumptions used in the performance of the studies shall be coordinated with the applicant and any potentially affected systems, and determined on a case-by-case basis and documented within the studies.

The IM, or the IM's designee, shall confirm that the applicant's new or materially modified existing interconnections are within a Balancing Authority Area's metered boundary.

When the proposed interconnection is found to be in conformance with Tri-State's requirements, the IM, or the IM's designee, and the applicant shall negotiate an Interconnection Agreement for the design, construction, ownership, operation and maintenance of the interconnection. Tri-State reserves the right to participate in any interconnection that may provide benefits to the reliability or transfer capability of the interconnected transmission system.

3.4 Information to Be Included with Facility Interconnection Request

- 3.4.1 The requestor shall provide the following detailed information for use in the transmission planning studies:
 - 3.4.1.1 Facility one-line diagram depicting detailed proposed facility connection points, voltage levels, equipment data, breaker/switch configurations, and protective relay zones.
 - 3.4.1.2 MW/MVAR capacity and/or demand at the point of connection including any special operational considerations or constraints.
 - 3.4.1.3 Transformer impedance data, winding configurations, voltage levels, thermal ratings, and available tap ranges.
 - 3.4.1.4 Generator nameplate data and machine constants, generator voltage rating, step-up, and auxiliary transformer data, impedance data, and ratings.
 - 3.4.1.5 Generator rotor, governor, exciter, power system stabilizer and any other generator auxiliary data in accordance with WECC generator data specifications.
 - 3.4.1.6 Generator MW/MVAR levels, reactive capability curves, operational power factors and proposed load factors.

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3.4.1.7 Transmission line configuration, impedance, voltage and thermal ratings.

The System Impact and Facilities studies shall typically be performed in multiple sequential stages. Phase 1 of the System Impact Study shall address a first level power flow screening analysis of the proposed interconnection facility. Phase 2 of the System Impact study shall address post-transient analysis, dynamic stability analysis, short circuit analysis, and any other required study work, including EMTP studies. Phase 3 (Facilities Study) shall detail the final interconnection facilities design, direct assignment facilities, costs and construction schedule estimates. EMTP studies may also be required, as determined on a case by case basis. The Interconnection Agreement shall not be executed until all of these steps have been successfully completed and all financial requirements met. The entity seeking to connect Generation, Transmission, or End-user facilities shall have the option to rescind the interconnection request following the completion of any of the study phases.

3.5. Tap Configurations

3.5.1. Generally, power circuit breakers must be installed at all interconnections within Tri-State's system. Single-line diagrams showing acceptable breaker arrangements for taps on Tri-State's system are specified in Substation Design Standard 04.06.01, Taps on Tri-State Looped Lines 230kV and Above, and Substation Design Standard 04.05.02, Taps on Tri-State Looped Lines 138kV and Below. General Design Considerations are specified in Substation Design Standard 02.

3.6. Breaker Duty and Surge Protection

3.6.1. With respect to the connection of Generation, Transmission, or End-user facilities, the IM, and/or the IM's designee, shall review breaker duty and surge protection to identify any additions required to maintain an acceptable level of Tri-State system availability, reliability, equipment insulation margins, and safety. Tri-State's breaker duty and surge protection requirements are set forth and published in Substation Design Standards, Standard 05.03.02: Chapter 5 (Major Equipment), Section 3 (High Voltage Circuit Breakers), Part 2 (Technical Specification).

3.7 System Protection and Coordination

3.7.1. Tri-State's system protection requirements shall be designed to ensure the safety of the general public and all utility personnel, to protect the Tri-State system from equipment damage, to promote reliable system

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operation and to comply with applicable NERC and WECC Regional Reliability Standard Requirements.

Tri-State shall not assume responsibility for protection of the requestor's interconnected facilities. The requestor is solely responsible for the installation of protection systems so that faults, imbalances or other disturbances on the Tri-State system do not cause damage to its facilities.

Tri-State's system protection and coordination requirements are set forth and published in the Substation Design Standards, Standard 12.03, Chapter 12 (Protective Relaying and Controls).

3.8. Metering and Telecommunications

- 3.8.1. Tri-State's metering requirements are set forth and published in Substation Design Standards, Standard 13.04 (Instruments, Transducers and Meters). All current transformers, voltage transformers and metering equipment must meet Tri-State specifications and accuracy standards. The requesting entity shall be responsible for telecommunications facilities sufficient to meet Tri-State's remote meter reading and EMS/SCADA requirements as set forth and published in Substation Design Standards, Standard 12.08 (Supervisory Control and Data Acquisition) and any required for or by the Balancing or Planning Authority.

3.9. Grounding and Safety Issues

- 3.9.1. All interconnection equipment shall be operated and maintained in accordance with manufacturer's recommendations, prudent utility practices, and applicable environmental and safety standards. The interconnection substation shall have a ground grid that solidly grounds all metallic structures and other non-energized metallic equipment. This grid shall limit the ground potential gradients to such voltage and current levels that shall not endanger the safety of people or damage equipment located in, or immediately adjacent to, the station under normal and fault conditions. Generation integration may increase fault current levels at nearby substations and require modifications to existing stations. Tri-State's requirements for grounding and safety are set forth and published in Substation Design Standards, Standard 9.04.01 (Grounding).

3.10. Insulation and Insulation Coordination

- 3.10.1. The customer shall ensure that all equipment is adequately protected from excessive system overvoltages. The Facilities Study shall determine when a transmission line switching study (transient analysis) is required. Such a study may be necessary to evaluate transient overvoltages caused by

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switching operations and to achieve proper insulation coordination. The study shall determine equipment Basic Insulation Level (BIL) requirements, surge arrestor requirements and/or breaker closing resistor requirements for the proposed facilities. Standard BIL levels are published in Tri-State's Substation Design Standard 4.08.01, Physical Layout and Clearances, Section 8, Insulators, Table 1 – Standard Insulator Application, BIL vs Altitude.

3.11. Voltage, Reactive Power, and Power Factor Control

3.11.1. The power factor for both Generation and End-user facilities shall be measured at the point of interconnection.

Generation facilities shall produce or absorb reactive power between 0.95 leading and lagging power factors, both steady state and dynamically, to meet voltage schedules on the bus to which they are connected. Such operations may require automatic voltage control in accordance with NERC standard VAR-002-1. They shall also have no consequential impact on the ability of the bulk electric system to meet the transient stability performance criteria as described in Tri-State's Engineering Standards Bulletin. The System Impact Study shall assess the ability of the generator to meet these requirements. Further integration studies may be necessary to determine the generator facility reactive power capabilities necessary to ensure that the steady state and dynamic requirements are met.

All End-user facilities connected directly to the Tri-State system shall maintain a power factor between 0.95 lag and 0.95 lead as measured at the point where the End-user load interconnects with Tri-State facilities. If this power factor requirement is not met, Tri-State may install power factor correction equipment at the End-user's expense.

Tri-State maintains transmission voltages at levels required for the reliable delivery of electricity. Tri-State typically maintains transmission voltage levels between 0.95 – 1.05 Per Unit during normal conditions and between 0.90 – 1.10 Per Unit during emergency conditions. Generation Interconnections and End-user facilities may be required to install their own voltage regulation equipment and coordinate any voltage set points or time delays with the normal transmission voltage bandwidths. Tri-State's performance criteria for voltage, reactive power, and power factor are set forth and published in Tri-State's Engineering Standards Bulletin, Criteria for System Planning and Service Standards.

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3.12. Power Quality Impacts

3.12.1. Harmonics can cause telecommunication interference, thermal heating in transformers, disruptions to solid state equipment and resonant over voltages. To protect equipment from damage, harmonics shall be managed and mitigated. The interconnected generator/load shall not cause voltage and current harmonics on the Tri-State system that exceed the limits specified in Tri-State's Engineering Standards Bulletin, Criteria for System Planning and Service Standards. All End-user facilities connected to the Tri-State system shall meet the power quality standards set forth in that document. The entity seeking to connect to the Tri-State system is responsible for any mitigation efforts necessary to meet those standards.

3.13. Equipment Ratings

3.13.1. With respect to the connection of Generation, Transmission, or End-user facilities, the requesting entity is responsible for ensuring that its facilities do not result in any violation of Tri-State equipment ratings. Costs associated with adhering to equipment ratings with respect to the new or modified facility shall be the responsibility of the requesting entity. Tri-State's requirements for Equipment Ratings are set forth and published in the Engineering Standards Bulletin, Criteria for System Planning and Service Standards.

3.14. Synchronizing of Facilities

3.14.1. Sync-check relays shall be required on all circuit breakers interconnecting transmission facilities to the Tri-State transmission system and shall be utilized to supervise the closing of those breakers. Manual closing of circuit breakers shall require verification of synchronism before closing. Automatic synchronization of generation shall also be supervised by a synchronizing check relay to assure that no connection to the transmission system is made without synchronization. All generation interconnections must meet all applicable ANSI and IEEE standards and be capable of operating within the full range of voltage and frequency excursions that may exist on the transmission system. At the time of check-out prior to energization, all facility interconnections shall follow the procedures in Substation Design Standard 18.01 (Testing and Checkout Services for Tri-State).

3.15. Maintenance Coordination

3.15.1. The owner of installed equipment shall be responsible for its proper operation and maintenance. Equipment shall be operated and maintained

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in accordance with manufacturer's recommendations, prudent utility practices, and applicable environmental and safety standards. The facility owner shall coordinate maintenance with Tri-State's transmission maintenance department. Tri-State's transmission maintenance department may require additional equipment to ensure a reliable interconnection and to safeguard the proper operating conditions of its power system.

Tri-State's transmission maintenance department shall be notified and have the right to witness settings and testing of relays, meters, and controls that could affect the integrity and security of the interconnected transmission system. Maintenance of facilities associated with system protection shall be consistent with NERC Reliability Standard PRC-005-6 or its successor. Tri-State's requirements for maintenance coordination are set forth and published in the Transmission Maintenance Standards, Section 3.0 – Inspections.

3.16. Operational Issues (abnormal frequency and voltages)

3.16.1. The facility connection studies shall identify impacts, deficiencies, operational issues (including abnormal frequency and voltages) and evaluate potential solutions. A proposed facility connection shall not degrade the reliability or operating flexibility of the existing power system. The proposed facility connection shall comply with all NERC, WECC and Tri-State standards. The IM, and/or the IM's designee, shall follow the steady state and transient requirements set forth in Tri-State's Engineering Standards Bulletin, Criteria for System Planning and Service Standards, and the requirements for operational issues (abnormal frequency and voltages) as set forth by the WECC.

3.17. Inspection Requirements for Existing or New Facilities

3.17.1. Protective relays and control systems shall be inspected and tested by functional trip checking prior to putting any interconnected facility in service. Tri-State personnel shall be involved with procedures prior to and during any maintenance and testing of protective relaying devices. The requesting entity shall be responsible for the costs associated with the ongoing testing and maintenance of the protective relaying and control equipment.

Tri-State personnel shall conduct an inspection of all new substation interconnection facilities prior to energization. The inspection requirements shall be consistent with the inspection requirements of Tri-State's existing substation facilities. Only after a satisfactory inspection is completed shall the new substation interconnection facilities be authorized

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for energization and synchronization. Tri-State's requirements for inspection of existing or new facilities are set forth and published in Substation Design Standards, Standard 18.01 (Testing and Checkout Services for Tri-State) and in Transmission Maintenance Standards, Section III (Inspections).

3.18. Communications and Procedures for Normal and Emergency Operating Conditions

3.18.1. All communications and operating procedures during normal and emergency operating conditions (abnormal frequency and voltages for example) shall be initiated and controlled by Tri-State Operations personnel. Any requests from the interconnected facility for any special operating considerations shall be submitted to Tri-State Operations for review and approval prior to execution. Emergency operating conditions shall be handled in accordance with NERC and WECC standards and good utility practice. The interconnection facility must recognize the dynamic nature of an interconnected transmission system and the reliability and safety priorities of Tri-State.

Circuit breakers, disconnects, interrupters and motor-operated disconnect switches that are an integral part of Tri-State's transmission system shall be operated and dispatched by Tri-State Operations. Tri-State Operations shall direct all switching and issue all clearances, hot-line orders, and general switching on the transmission portion of the interconnection. This shall require use of approved Tri-State switching, tagging and clearance procedures. Tri-State's requirements for communications and procedures during normal and emergency operating conditions are set forth and published in Tri-State Generation and Transmission Association, Inc. Emergency Operations Plan, Version 10/27/2008.

3.19. Power System Stabilizers

Technical studies and operations experience support a continuing need for power system stabilizers (PSS) to improve dynamic operation and allow non-oscillatory attainment of desired loading levels in the Western interconnected power system. It is necessary for large numbers of these devices to be available for operation in the WECC to provide the required system damping while allowing for some of them to be out of service. As such, PSSs are required on all generation units that meet the requirements of the "WECC Policy Statement on Power System Stabilizers." PSSs are generally not applicable to wind and solar PV generation facilities.

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4.0 **ENGINEERING/DRAWING REQUIREMENTS**

All engineering costs and engineering review costs shall be the responsibility of the requesting party. Modifications to Tri-State's transmission system to accommodate the proposed interconnection shall adhere to Tri-State's Substation Design Criteria. Any variation from the Substation Design Criteria may be considered on a case-by-case basis. Drawings for facility additions shall conform to Tri-State's Drafting Standards and be approved by Tri-State's transmission engineering department. "As-built" drawings shall be provided prior to final approval by Tri-State's transmission engineering department. Drawings shall include, but not be limited to, station plot plans, equipment layouts, single-line diagrams, control circuit schematics, and wiring diagrams. Updated copies of these drawings shall be furnished to Tri-State's transmission engineering department within 60 days of any modification to non-Tri-State owned equipment or substations on Tri-State's system.

Breakers and switches installed in Tri-State substations shall adhere to Tri-State numbering schemes. All switches to be operated by Tri-State shall be locked with locks furnished by Tri-State. All switches to be operated by Tri-State shall conform to Tri-State specifications.

5.0 **FACILITY INTERCONNECTION REQUIREMENTS AND STUDY PROCEDURES REVIEW**

The *Facility Interconnection Requirements and Study Procedure* shall be reviewed as needed. The following procedure shall be followed to maintain this document:

- 1) A review shall be conducted as needed by personnel designated by the IM.
- 2) Changes made to the procedure shall be logged in the version history.
- 3) After review and approval by those listed on the procedures cover page, the IM shall disseminate the revised procedure to the internal distribution list on the cover page.

The IM shall make this documentation available to all users of the transmission system and to WECC and NERC upon request. The IM is responsible for maintaining this documentation and for making it available to requesting entities within forty-five business days.