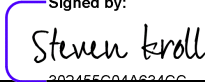


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6110 Facility Interconnection Requirements	
Relevant Standards: FAC-001-4 R1, R1.1, R1.2, R1.3, R3, R3.1, R3.2, R3.3	
NERC ID: NCR01101 (GRDA Functions) TO	Review/Approval Date: 07/30/2026 Next Review Date: 07/30/2027
Predecessors: 6110 Facility Connection Requirements Procedure	

Effective Date:
08/01/2026

Reviewed and Approved By:

Printed Name	Title
Steven Kroll	Director, Power Systems Engineering
Signature	Date
Signed by:  302455604A6346C...	07-30-2026 3:04 PM CDT

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1 Introduction

1.1 Purpose

To ensure GRDA documents Facility interconnection requirements and makes GRDA Facility interconnection requirements available upon request *[FAC-001-4 Purpose]*.

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2 Requirements

2.1 GRDA/SPP Interaction

GRDA is an active, participating member of the Southwest Power Pool (SPP) and is represented on the SPP Transmission Working Group. GRDA shares its planning, design, and approval authority with applicable working groups within SPP for the purpose of providing an integrated, reliable transmission system both for GRDA and for the SPP operating region. Studies and assessments provided to these SPP groups will include definition of study assumptions, system performance results, any alternatives which were considered, and jointly coordinated recommendations for analysis and consideration by the applicable working group(s).

SPP is responsible for the completion and approval of overall system plans throughout the planning horizon. GRDA abides by SPP policies, practices, and planning criteria concerning all system extensions, additions, and interconnections. Final review and approval authority for new and/or additional Generation and Transmission Facilities connected to the GRDA transmission system rests with SPP.

2.2 Standards

All new or modified generation, transmission, or end-use facilities shall comply with all applicable codes, standards, government regulations, environmental regulations, siting requirements, contracts, operating agreements, and tariff requirements related to the facilities identified above. These include, but are not limited to, all NERC Reliability Standards and SPP Supplements to those standards that are applicable to the Functional Entity, as defined by NERC. Note that no sub-regional regional requirements pertain to GRDA. GRDA is a Transmission Owner; this document serves as the official Transmission Owner planning criteria and contains all necessary facility interconnection requirements for the GRDA Transmission System.

2.3 Generation Facilities Interconnection Requirements [FAC-001-4 R1] [FAC-001-4 R1.1]

The owner of the proposed or exiting generation Facility is responsible for completing Appendix 1 of the Generator Interconnection Procedures (GIP) contained in Attachment V of the SPP Open Access Transmission Tariff (OATT) and submitting it to SPP as the Regional Planning Authority (PA). This submittal will begin the process required for evaluation of the possible generator interconnection and is required regardless of the size of the generation unit. This OATT document is available to the public at the SPP internet site.

SPP will contact GRDA to set up a scoping call to establish project parameters. GRDA will develop a Concept of Service(COS) based on the parameters discussed on the scoping call.

Notification point at GRDA:

GRDA Director, Power Systems Engineering
9933 E. 16th St.
Tulsa, Oklahoma 74128

Phone: 918-610-9669
Email: Steven.Kroll@grda.com

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All studies done by SPP in response to this request shall be done at the expense of the Generation Facility Owner as defined in Attachment V of the OATT. The final approval and acceptance of the proposed connection to the interconnected transmission system rests with SPP. Note that nothing in the GIP process shall constitute a request for transmission service or confer upon an Interconnection Customer any right to receive transmission service.

2.4 Transmission Facilities Interconnection Requirements [FAC-001-4 R1] [FAC-001-4 R1.2]

The owner of the proposed or exiting Transmission Facility shall complete a **6110A Initial Interconnection Request Notification Form** and notify the GRDA Director, Power Systems Engineering of its intent to construct a transmission facility attached to the GRDA transmission system as soon as the owner begins considering such a project. The Transmission Facility owner shall coordinate and cooperate with GRDA to provide the general location of the proposed interconnection, the interconnect voltage, the reason for the interconnection, the requested capacity of the interconnection, and projected in-service date to GRDA.

Notification point at GRDA:

GRDA Director, Power Systems Engineering
9933 E. 16th St.
Tulsa, Oklahoma 74128

Phone: 918-610-9669
Email: Steven.Kroll@grda.com

GRDA will inform SPP of the proposed transmission addition and requested interconnection. As a member of the Southwest Power Pool (SPP), GRDA's transmission facilities make up a part of the SPP Transmission System and SPP is the Transmission Provider for services on that system. As such, SPP is responsible for the conditions under which transmission service is provided upon the system.

GRDA engineers will meet with the Transmission Facility owner to obtain details and data concerning the connection for the purpose of performing system studies of the effect of the connection on the transmission system. Applicable charges will be assessed by GRDA for its engineering work preparing these studies.

Transmission planning studies must be performed as necessary to determine the impact on the interconnected transmission system when connecting new and/or modified end-use facilities. Studies shall include evaluations of system performance under both normal and contingency conditions in accordance with the current NERC TPL Standards.

If the Customer requesting transmission service is a utility, they shall then contact SPP and make application for Point to Point Transmission Service, or Network Integration Transmission Service, as defined in the *Open Access Transmission Tariff* (OATT). If the Customer requesting transmission service is not a utility, GRDA will make this request on their behalf. The OATT document is available to the public at the SPP internet site.

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SPP will be responsible for any additional studies, contracts, and other documentation required of the Customer to secure the service(s) requested. The final approval and acceptance of any proposed transmission connection and transmission service to that connection from the SPP interconnected transmission system rests with SPP.

2.4.1 Load Flow Analysis

A load flow (steady state) analysis is conducted by establishing a mathematical model of the power system and simulating certain specified operating conditions. The results predict power flow magnitudes and voltage levels under the loss of any individual system element. The load flow analysis enables the prediction of equipment overloads and the determination of excessive voltage drops, which may be encountered.

2.4.2 Short Circuit Analysis/Breaker Rating Analysis

A short circuit (i.e., fault current) analysis will be performed as necessary to determine the effect that the new generation will have on the system fault currents. This data will be used to evaluate the impact of the generation on the fault duty (i.e., interrupting capability or rating) of the previously installed equipment such as circuit breakers and switches.

2.4.3 Transient Stability Analysis

A transient stability (dynamic) analysis will be performed as necessary to determine the transmission system's response to a sudden change in the state of the system due to faults on the system and unit outages. Specifically, the analysis will evaluate the transmission system in the area of the added generation as well as the generator's response following faults in the system.

2.5 End-User Facilities [FAC-001-4 R1] [FAC-001-4 R1.3]

2.5.1 Delivery Point Additions or Modifications Interconnection Requirements

GRDA follows SPP requirements for evaluation of proposed new loads or modifications to existing facilities through use of the SPP AQ process. GRDA is responsible for acquiring the information identified in the **6110B Required Data For Facilities Interconnections Form** and the **6110C Load Ramp Table Form** and then submitting these forms to SPP for analysis prior to further study [FAC-001-4 R1] [FAC-001-4 R1.3].

2.5.1.1 Distribution Voltage End-Users Interconnection Requirements

As the Distribution Provider, GRDA provides retail electric service at distribution voltages to customers located in the Mid America Industrial Park south of Pryor, Oklahoma, only. For retail service requests and information, the End-User should contact the following:

Notification point at GRDA:

GRDA Director, Power Systems Engineering
9933 E 16th St.
Tulsa, Oklahoma 74128

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Phone: 918-610-9669
Email: Steven.Kroll@grda.com

Connection requirements, costs, and standards for retail customers are included in the **GRDA Terms and Conditions of Service**, available from the GRDA Manager of Business Development.

2.5.1.2 Transmission Level Voltage End-Users with GRDA Interconnection Requirements

End-User, or Load Serving Entity facilities, requiring transmission level service voltage which will be supplied by GRDA wholesale or retail power contracts fall under the responsibility of the GRDA Director, Power Systems Engineering. GRDA provides transmission level service at 69 kV, 138 kV, 161 kV and 345 kV depending upon the location of the service request. The End-User customer shall coordinate and cooperate with GRDA to provide the general location of the proposed connection, the required voltage, the requested capacity of the interconnection, the expected load factor or an indication of the load profile of the customer, and projected in-service date to GRDA.

Notification point at GRDA:

GRDA Director, Power Systems Engineering
9933 E 16th St.
Tulsa, Oklahoma 74128

Phone: 918-610-9669
Email: Steven.Kroll@grda.com

Customer contracts are required for such services and the costs associated with the required GRDA infrastructure and system improvements are paid by the customer. The GRDA Engineering Department shall review and approve connection, metering, and protection designs for all interconnection facilities.

2.5.1.3 Transmission Level Voltage End-Users with Service from Third Parties Interconnection Requirements

End-User Facilities requiring transmission level service voltage which will be supplied by Third Parties fall under the responsibility of the GRDA Director, Power Systems Engineering and SPP. Such service is considered as a Transmission Interconnection under the SPP OATT, and SPP approval is required.

GRDA provides transmission level service at 69 kV, 138 kV, 161 kV, and 345 kV depending upon the location of the service request. The End-User customer shall coordinate and cooperate with GRDA to provide the general location of the proposed End User Connection, the required voltage, the requested capacity, the expected load factor or an indication of the load profile of the connection, and the projected in-service date to GRDA. GRDA will then notify SPP of the proposed interconnection and the Customer will then be required to provide information and comply with SPP requirements as listed in the “*Transmission Facilities*” section above.

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Customer contracts are required for such services and the costs associated with the required GRDA infrastructure and system improvements are paid by the customer. The GRDA Engineering Department shall review and approve connection, metering, and protection designs for all interconnection facilities.

2.6 Summary Plans to Achieve Required Systems Performance through the Planning Horizon

The studies listed above and below are performed by GRDA in conjunction with SPP. Once the facilities are approved by SPP and all parties agree that they will be constructed, they become part of the SPP system database for all future system studies. These studies include the short- and long-term studies, as required by SPP throughout the planning horizon.

2.6.1 Procedures for coordinated studies of new interconnections and their impact on affected systems [FAC-001-4 R3] [FAC-001-4 R3.1].

The coordinated studies of new interconnection(s) and their impact on affected systems are done by GRDA and the facility owner. GRDA engineers will meet with the new interconnection(s) facility owner to obtain details and data concerning the connection for the purpose of performing system studies of the effect of the new interconnection(s) on the transmission system. Such studies shall include load flow and short circuit for the system with the additional facility. If the facility is a generator, the studies include a stability study. If the results of these studies indicate potential impacts, they will be presented to SPP for review.

Once the customer submits a Generation Interconnection Request or an Application for Transmission Service, that customer facility plan's impact on the SPP system is included in the process of current and future studies as determined by SPP and the conditions of the OATT under which the application falls.

2.6.2 Procedure for coordinated studies for an existing interconnection seeking to make a Qualified Change and their impact on affected systems [FAC-001-4 R3] [FAC-001-4 R3.1].

The coordinated studies for existing interconnections seeking to make a Qualified Change and their impact on affected systems are done by GRDA and the facility owner. GRDA engineers will meet with the existing interconnection facility owner to obtain details and data concerning the connection for the purpose of performing system studies of the effect of the existing interconnection facility seeking to make a Qualified Change on the transmission system. Such studies shall include load flow and short circuit for the system with the modified transmission facility. If the facility is a generator, the studies include a stability study. The results of these studies indicate potential impacts, they will be presented to SPP for review.

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Once the customer submits a Generation Interconnection Request or an Application for Transmission Service, that customer facility plan's impact on the SPP system is included in the process of current and future studies as determined by SPP and the conditions of the OATT under which the application falls.

2.6.3 Procedures for notification to SPP of a new interconnection [FAC-001-4 R3] [FAC-001-4 R3.2].

The owner of the proposed new interconnection(s) shall notify the Director, Power Systems Engineering of GRDA of its intent to construct a generating, transmission, or end-user facility attached to the GRDA transmission system as soon as the owner begins considering a location that involves the GRDA transmission system. GRDA will notify the Southwest Power Pool (SPP) of the proposed new interconnection.

2.6.4 Procedures for notification to SPP of an existing interconnection seeking to make a Qualified Change [FAC-001-4 R3] [FAC-001-4 R3.2].

The owner of an existing interconnection seeking to make a Qualified Change shall notify the Director, Power Systems Engineering of GRDA of its intent as soon as the owner begins considering a Qualified Change that involves the GRDA transmission system. GRDA will notify the Southwest Power Pool (SPP) of the existing interconnection seeking to make a Qualified Change.

2.6.5 Procedures for confirming a new Facility is within a Balancing Authority Area's metered boundaries [FAC-001-4 R3] [FAC-001-4 R3.3]

The owner of the proposed new Facility shall confirm to GRDA they have made appropriate provisions with a Balancing Authority to operate within its metered boundaries. Confirmation shall be received in writing from the applicable Balancing Authority to the Director, Power Systems Engineering of GRDA.

2.6.6 Procedures for confirming an existing Facility seeking to make a Qualified Change is within a Balancing Authority Area's metered boundaries [FAC-001-4 R3] [FAC-001-4 R3.3]

The owner of the existing Generating, Transmission, or End-User Facility seeking to make a Qualified Change shall confirm to GRDA they have made appropriate provisions with a Balancing Authority to operate within its metered boundaries. Confirmation shall be received in writing from the applicable Balancing Authority to the Director, Power Systems Engineering of GRDA.

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2.6.7 Voltage level and MW and MVAR capacity or demand at point of interconnection [FAC-001-4 Technical Rationale and Justification]

The owner of the proposed Generation, Transmission, or End-User Facility shall notify GRDA of the planned voltage capacity level and the capacity (MW and MVAR) with his original proposal for the generation facility. That information will be passed to SPP in GRDA's initial contact with SPP. That information will also be provided by the owner to SPP in the various forms required for the Large Generator Interconnection studies, the Point-to-Point Interconnection studies, or the Network Integration Transmission Service studies. If the project is approved by SPP, its data is included within the SPP data base and that information remains in the database for future studies until removed by SPP as a result of customer choice. The voltage, MW, and MVAR capacity or demand requirements are included in future studies and evaluated according to SPP parameters. If changes to the SPP transmission system are required to maintain the values within specified limits, the system changes will be made and the charges reimbursed according to SPP rules.

GRDA standards for interconnection to its system limit voltage fluctuations from 95% to 105% under normal conditions. During contingencies, system voltages can exist between 90% and 105%.

GRDA power factor standards allow a minimum 98% lagging power factor before penalty is imposed.

2.6.8 Breaker duty and surge protection [FAC-001-4 Technical Rationale and Justification]

Breaker duty and surge protection levels are determined based on system studies that consider the impact of the Generation, Transmission, or End User Facility at the time the facility is proposed. Once constructed, the facilities are included in future studies. If later system improvements modify the breaker duty or surge protection requirements, those changes will be indicated in the studies concerning the improvements. If changes in breaker duty or surge protection are necessary due to later system improvements, then those changes will be directed by SPP and the costs covered under the SPP policies.

2.6.9 System protection and coordination [FAC-001-4 Technical Rationale and Justification]

Once the Generation, Transmission Interconnect, or End-User Facility has been approved by the necessary levels in the SPP acceptance process, the owner's engineers shall work with GRDA to coordinate system protection devices and plans between the GRDA transmission system and the new facility source. If questions arise, GRDA and/or SPP decisions shall determine the final system requirements.

2.6.10 Metering and telecommunications [FAC-001-4 Technical Rationale and Justification]

GRDA requires real-time communications for operation of the SCADA system and for telemetered load data. Once the Generation, Transmission Interconnection, or End User Facility has been approved by the necessary levels in the SPP acceptance process, the owner's engineers shall work with GRDA to coordinate metering and telecommunications systems requirements between the GRDA transmission system and the facility so that these systems can be incorporated into the construction process for the facility. For additional information reference Appendix A – GRDA Metering Requirements for Transmission Interconnection Facilities.

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2.6.11 Grounding and safety issues [FAC-001-4 Technical Rationale and Justification]

Once the Generation, Transmission Interconnection, or End User Facility has been approved by the necessary levels in the SPP acceptance process, the owner's engineers shall work with GRDA to identify and mitigate any grounding and/or safety concerns. Current issues of industry safety manuals and safety codes shall be used as the basis for solving problems in these areas of concern. GRDA shall provide the owner with calculated fault currents from the GRDA system at the proposed facility location for use in design of the grounding system by the owner's engineers. GRDA will review the owner's designs as they affect any mutual interconnections of grounding systems.

2.6.12 Insulation and insulation coordination [FAC-001-4 Technical Rationale and Justification]

Once the Generation, Transmission Interconnection, or End User Facility has been approved by the necessary levels in the SPP acceptance process, the owner's engineers shall work with GRDA to determine insulation level requirements for the facility. In general, GRDA uses the following insulation design levels on its transmission system:

Voltage Class (kV)	Insulation Level (BIL)
69	350
138	650
161	750
345	1300

2.6.13 Voltage, reactive power, and power factor control [FAC-001-4 Technical Rationale and Justification]

Once the Generation, Transmission Interconnection, or End User Facility has been approved by the necessary levels in the SPP acceptance process, the owner's engineers shall design their systems such that they meet SPP contract requirements for these variables. Voltage, reactive control, and power factor control are all covered within the service agreements which will be established between the owner and SPP.

2.6.14 Power quality impacts [FAC-001-4 Technical Rationale and Justification]

It shall be the responsibility of the Generation, Transmission Interconnection, or End User Facility Owner to solve and correct at the Owner's costs any power quality issues caused on the GRDA and/or SPP transmission systems by the facility.

2.6.15 Equipment ratings [FAC-001-4 Technical Rationale and Justification]

Once the Generation, Transmission Interconnection, or End User Facility has been approved by the necessary levels in the SPP acceptance process, the owner's engineers shall design and specify the equipment in the facility using the equipment ratings provided to SPP for the various studies used to accept the facility. Any use of ratings that result in installed equipment having a rating not consistent with that provided for the SPP studies will result in denial of final connection of the facility to the GRDA and SPP transmission system.

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2.6.16 Synchronizing of facilities *[FAC-001-4 Technical Rationale and Justification]*

It shall be the requirement of the Generating, Transmission Interconnection, or End User Facility to synchronize its operating equipment to the 60-Hertz system in dynamic operation on the GRDA and SPP transmission system(s). The facility shall include such relaying and protective equipment as may be necessary to ensure that the facility equipment cannot be inadvertently closed onto the transmission system in an out-of-phase operating condition.

The facility shall also be equipped with underfrequency protective equipment that shall be set per SPP Planning Criteria (see SPP Effective Planning Criteria,) to disconnect the facility from the SPP transmission system and to “island” the generation equipment or de-energize the transmission interconnection or end-user connection under certain decreasing frequency conditions on the transmission system. Maintenance and testing of the necessary underfrequency relaying systems shall be the responsibility of the facility owner.

2.6.17 Maintenance coordination *[FAC-001-4 Technical Rationale and Justification]*

As part of the interconnection or service agreements between the Generating, Transmission Interconnection, or End User Facility and SPP, the facility owner shall agree to coordinate the scheduling of maintenance outages at the facility through SPP for the benefit of all concerned.

2.6.18 Operational issues (abnormal frequency and voltages) *[FAC-001-4 Technical Rationale and Justification]*

As part of the interconnection or service agreement between the Generating, Transmission Interconnection, or End User Facility and SPP, the facility owner shall agree to pursue solutions aggressively if operational issues such as abnormal frequency or voltages occur at the facility. The facility owner shall work with SPP to resolve the problem(s) for the benefit of all concerned.

If abnormal voltage and frequency problems cannot be resolved within a time frame determined by SPP, SPP retains the right to disconnect the facility from the GRDA and SPP transmission system, if necessary, to maintain electrical system stability, acceptable power quality, and continuity of service to the other customers and loads supplied by the transmission system.

2.6.19 Inspection requirements for new or existing interconnections seeking to make a qualified change *[FAC-001-4 Technical Rationale and Justification]*

The Generation, Transmission Interconnection, or End User Facility owner shall agree to allow representatives from GRDA and SPP to inspect the facility prior to its connection to the GRDA transmission system to verify the existence, operational capability, and functional condition of the required system protective equipment. GRDA and SPP representatives shall be present to witness the testing and commissioning of the protective relay systems and the synchronizing system. The Owner shall provide GRDA and SPP with copies of the relay test results for record purposes.

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GRDA personnel shall install, inspect, test, activate, and maintain the metering and telecommunications equipment necessary to monitor the Generation, Transmission Interconnection, or End User Facility generation, load, voltage, frequency, and/or other variables as determined by GRDA. The facility owner shall allow access to the facility by GRDA personnel any time during normal working hours or emergency conditions for the purpose of inspecting and maintaining the GRDA equipment.

2.6.20 Communications and procedures during normal and emergency operating conditions [FAC-001-4 Technical Rationale and Justification]

The Generation, Transmission Interconnection, or End User Facility owner shall communicate with SPP directly during normal and emergency operating conditions.

2.7 Interconnection Study Process Overview

2.7.1 Cost Responsibility

The Interconnection Customer shall be responsible for all costs incurred by GRDA in evaluating a proposed interconnection. Such costs may include, but are not limited to, engineering reviews, planning studies, consultant services, environmental reviews (when applicable), and other activities necessary to determine the technical feasibility of the proposed interconnection and identify any required modifications to the GRDA transmission system.

This document is informational in nature only and does not constitute an offer, contract, commitment to provide service, or approval of any proposed interconnection. Prior to initiating engineering studies beyond the initial application review, GRDA may require the Interconnection Customer to execute a Study Cost Agreement. The Study Cost Agreement shall define the scope of the engineering study, provide an estimate of the anticipated study costs, establish the billing methodology and payment terms, and identify any required deposits or advance payments. The estimated study costs may include engineering costs incurred by GRDA, applicable study deposits and fees required by the Southwest Power Pool (SPP), and other anticipated costs associated with completion of the engineering study.

The estimated study costs identified in the Study Cost Agreement are non-refundable once engineering work has commenced. The cost estimate represents GRDA's best estimate of the engineering effort required based on the information available at the time the agreement is executed and is intended to encompass the anticipated costs of completing the engineering study. If, during the course of the engineering study, GRDA or SPP determines that additional engineering effort, supplemental studies, or restudies are necessary and the anticipated costs are expected to exceed the original estimate, GRDA shall notify the Interconnection Customer before incurring the additional costs. The Interconnection Customer shall have the opportunity to authorize the additional work through an amendment to the Study Cost Agreement or to withdraw the interconnection request. In the event the Interconnection Customer elects to withdraw the request, the Interconnection Customer shall remain responsible for all costs incurred by GRDA through the date of withdrawal.

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The Interconnection Customer shall also be responsible for all applicable SPP study costs, deposits, fees, restudy costs, and other charges required under the SPP Open Access Transmission Tariff (OATT) and associated business practices.

2.7.2 GRDA Engineering Review [FAC-001-4 R3] [FAC-001-4 R3.1, R3.2, R3.3]

Upon receipt of a complete Interconnection Request and execution of any required Study Cost Agreement, GRDA shall perform an engineering review of the proposed interconnection. The purpose of the engineering review is to evaluate the technical feasibility of the proposed interconnection and to develop one or more Concepts of Service (COS) for consideration by GRDA and the Interconnection Customer.

A Concept of Service is a preliminary planning document that identifies one or more technically feasible approaches for serving the proposed interconnection. Depending on the complexity of the project, a Concept of Service may evaluate alternative transmission configurations, points of interconnection, delivery arrangements, and other planning considerations necessary to support the requested service. The Concept of Service is intended to facilitate planning discussions between GRDA and the Interconnection Customer and to establish the basis for any required coordination with SPP.

The engineering review may include, as applicable:

- Review of the Interconnection Customer's application and supporting technical information.
- Development and evaluation of one or more Concepts of Service (COS).
- Evaluation of potential points of interconnection and transmission service alternatives.
- Assessment of impacts to the existing GRDA transmission system.
- Power flow, short-circuit, breaker duty, voltage, transient stability, protection coordination, and other engineering analyses, as applicable.
- Preliminary identification of transmission facilities, system modifications, and potential network upgrades that may be required to accommodate the proposed interconnection.
- Development of planning-level cost estimates.
- Determination of whether coordination with SPP is required.

Upon completion of the engineering review, GRDA shall provide the Interconnection Customer with a written summary of the study results. As appropriate, the summary may include one or more Concepts of Service (COS), preliminary system impacts, potential transmission facilities and system modifications, planning-level cost estimates, recommended next steps, and any anticipated coordination with SPP.

The results of the GRDA engineering review are intended to support planning and customer decision-making and do not constitute approval of the proposed interconnection or establish the final scope of facilities required to complete the interconnection. Final facility requirements remain subject to the applicable SPP interconnection process and any subsequent engineering studies.

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2.7.3 Coordination with Southwest Power Pool (SPP) [FAC-001-4 R3] [FAC-001-4 R3.1, R3.2, R3.3]

Where required, GRDA shall coordinate the proposed interconnection with the Southwest Power Pool (SPP). Upon completion of the GRDA Engineering Review and development of a preferred Concept of Service (COS), GRDA will determine whether the proposed interconnection requires review under the applicable SPP Open Access Transmission Tariff (OATT).

For projects requiring SPP review, GRDA will coordinate with the Interconnection Customer to initiate the appropriate SPP interconnection process. GRDA shall provide available planning information, study results, and the preferred Concept of Service, as appropriate, to support the SPP review process.

The SPP interconnection process is administered by SPP in accordance with the SPP Open Access Transmission Tariff (OATT) and associated business practices in effect at the time the interconnection request is submitted. SPP may identify additional study requirements, alternative transmission configurations, network upgrades, or other system modifications beyond those identified during the GRDA Engineering Review.

The Interconnection Customer shall cooperate with GRDA and SPP throughout the regional study process and provide any additional technical information necessary to complete the required evaluations.

2.7.4 Reservation of Discretion

Nothing in this document obligates GRDA to approve any interconnection request, construct facilities, provide transmission service, or enter into any agreement.

2.8 Specific Requirements for Interconnections with the GRDA Transmission System

The requirements contained in this section establish the minimum engineering requirements applicable to new interconnections with the GRDA Transmission System. Final interconnection requirements shall be based upon the results of the GRDA Engineering Review, applicable Southwest Power Pool (SPP) studies, and any executed interconnection agreements. These requirements are intended to ensure the safe, reliable, and maintainable operation of both the GRDA Transmission System and the Interconnection Customer's facilities.

2.8.1 Introduction

1. The Grand River Dam Authority (GRDA) is the owner of the referenced transmission system.
2. The requesting utility shall be designated as the "Requestor".
3. "BES" shall be the Bulk Electric System as defined in the glossary of the current version of NERC standards. The current definition includes circuits operating at voltages of 100 kV and higher.
4. "Operational Control" shall mean direct control of a device through the GRDA SCADA system and/or direct physical control at the installation.

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5. The Operational Control of all interconnection devices attached to GRDA's transmission facility shall remain with GRDA. As such, any new interconnection devices attached to GRDA's facility resulting from use of requirements in this document shall be transferred to and become GRDA's property for purposes of operation, control, maintenance, and replacement. The Requestor may be required to pay for the initial construction of the interconnection facility, but it becomes GRDA's responsibility after transfer of ownership to GRDA.

2.8.2 General Requirements for All Interconnections

1. The interconnection configuration ultimately selected for a proposed project shall be determined by GRDA based on the results of the GRDA Engineering Review, applicable SPP studies, the Interconnection Customer's service requirements, system reliability, operational considerations, maintainability, safety, future transmission system development, and sound utility engineering practice. The interconnection configurations described in this section represent typical acceptable configurations; however, GRDA reserves the right to require an alternate configuration when, in the judgment of GRDA Engineering, such configuration is necessary to ensure the safe, reliable, and economical operation of the GRDA Transmission System.
2. The Requesting party must submit designs, calculations, and drawings for approval by GRDA for structures and foundations associated with line interconnections. The Requesting party's design shall meet or exceed the GRDA's design requirements. No taps onto the GRDA transmission system will be allowed until the designs are approved by the GRDA Engineering department.
3. The Requestor shall coordinate all work, including notifying the GRDA at least 10 working days before beginning any construction, installation, or checkout of work. Notification will include time of the proposed outage. Approval of the requested construction may be withheld depending upon the ability of the GRDA to schedule the line outage through its Reliability Coordinator.
4. The Requestor shall provide a qualified construction inspector. If the Requestor cannot provide an inspector, then the GRDA, at its discretion, may provide one and bill the Requestor for inspection services. If the Requestor provides an inspector and GRDA also provides an inspector/representative, GRDA may not bill for these services.
5. Copies of all tests performed during installation by the Requestor will be provided to GRDA upon request. Acceptance testing performed by GRDA will be at GRDA's expense.
6. GRDA shall inform the Requestor in advance of any switching to be performed on the line tapping structure or the tap breaker in a switching substation. Notification for non-emergencies will be in accordance with timeframes specified within the SPP Reliability Coordinator Outage Coordination Methodology (see SPP RC Outage Coordination Methodology). Emergency notifications shall be as early as possible without intentional delay.
7. GRDA shall perform all maintenance on the tapping structure and provide a copy of all maintenance records to the Requestor upon request.
8. GRDA shall be responsible for the cost of any future replacement of the Group Operated Air Break (GOAB) Switch and/or structure.

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9. A line section protected by circuit breakers may have a mileage maximum length for tap lines that are not protected by circuit breakers, determined on a case-by-case basis. In general, the total tap line lengths of all tap lines on a single transmission circuit should be no more than ten miles or 20 percent of the length of the tapped transmission circuit, whichever is shorter.
10. Four (4) terminal lines shall not be allowed. Three (3) terminal lines shall only be approved on a case by case basis and are discouraged because of protection concerns.
11. For taps serving load, an ungrounded high voltage winding is the required transformer connection.
12. For taps connecting generation, a grounded high voltage winding is the required transformer connection.
13. New transmission lines of all voltages must have overhead ground wire shielding over the entire length of the tap line. The shield wire shall be grounded at each structure.
14. Interconnections may require interconnection grade metering equipment. If so, it shall be installed at the cost of the Requestor. Designs for required current transformer and potential transformer installation shall be approved and coordinated with GRDA, especially if support structure installation for those devices is provided by Requestor. Ownership of said structures shall be transferred to GRDA upon completion of the interconnection.
15. GRDA shall determine the appropriate interconnection configuration based on the results of the Engineering Review, applicable SPP studies, and sound utility engineering practice. At a minimum, breakered substations shall be required for the following interconnections:
 - a. A tap or interconnection to a generation facility
 - b. A tap or interconnection to a transmission line that is looped to another electric utility or one capable of being supplied power from another electric utility.
 - c. A tap to a radial transmission line to serve more than one distribution substation or which is planned to serve more than one distribution substation. Connection of a second distribution substation to an existing un-breakered tap may require installation of breakers or circuit switchers at the Requestor's expense.

2.8.3 Interconnection to a GRDA BES Transmission Line

1. Proposed taps to the GRDA BES facilities are subject to approval by GRDA based on the results of the GRDA Engineering Review, applicable SPP studies and sound utility engineering practice. The interconnection configuration shall be selected by GRDA to maintain the safety, reliability, operability, maintainability, and long-term development of the GRDA Transmission System.
2. Direct taps to existing transmission lines may be permitted when determined acceptable by GRDA. Typically, as long as N-1 outage criteria are not violated and all loads can be fed radially from either terminal. N-1 outage criteria means the interconnected power system must be operated at all times so that general system instability, uncontrolled separation, cascading outages and/or voltage collapse will not occur as a result of the loss of a single system element. Upon review of the proposed tap, the GRDA may require equipment in addition to that described below to maintain reliability, reduce duration of outages, and/or facilitate maintenance of transmission facilities.

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3. Whenever possible, and as determined by GRDA, a proposed interconnection to a BES transmission line will be made at an existing substation. If no substation exists, then the GRDA may require the Requestor to construct, or pay for GRDA to construct, a switching station for the purpose of making the interconnection.
4. Circuit breakers or circuit switchers, as determined by the GRDA, must be installed in the line sectionalizing positions for all tap substations. These circuit interrupting devices will be used to de-energize line sections when necessary without interruption of the tapped loads. Circuit switchers, if used, must have an integral disconnect switch with a visible air gap. Normally, GRDA assumes ownership of all line sectionalizing devices; however, even if GRDA does not assume ownership, GRDA will still maintain direct Operational Control.
5. Only one interconnection without sectionalizing circuit breakers is ever permitted between transmission line breakers.
6. The interconnection may be connected on either the high side or low side of transformation at the tap. Two or more connections at the high side of an existing tap are considered multiple taps and may require sectionalizing circuit breakers.
7. Transmission lines shall be sectionalized whenever autotransformers or three-winding transformers are installed on the tap(s).
8. All BES transmission lines are to be protected by high-speed relaying schemes utilizing protective relay communications and will be specified by GRDA Engineering. Relaying installed to clear tap line circuit faults must not measurably degrade the line relaying or interfere with the capability of high-speed reclosing of the tapped transmission line. High-speed clearing of all tap line faults from the tap station will be required under normal operating conditions if the tap station is a source of positive sequence fault current to faults on the tapped line.
9. Line sectionalizing devices must be capable of Supervisory Control and Data Acquisition (SCADA) system control. A remote terminal unit (RTU) must be installed at all tap substations including all associated equipment to provide for SCADA control.

2.8.4 Interconnection to a GRDA 69 kV Transmission Line – Tap Structure

1. If the interconnection is the first one on a transmission line between two breakers, the interconnection can be made using a line tapping structure with GOAB switches.
2. If the switching devices have motor operators and SCADA control, remote indication status shall be made available to the Requestor.

2.8.5 Interconnection to a GRDA 69 kV Transmission Line – Substation

1. The construction cost to a condition of “operationally ready” of a new substation or modifications to an existing substation for an additional interconnection (or interconnections) shall be the responsibility of the Requestor. After completion of a new substation, the Requestor shall transfer ownership of the high-voltage section of the new substation to GRDA.
2. Modifications to an existing GRDA substation for any additional interconnections shall be designed and completed by GRDA and funded by the Requestor. Ownership of all high voltage substation modifications made in response to Requestor shall remain with GRDA. SCADA indication of GRDA controlled devices shall be made available to the Requestor if requested. Operational Control of all other non-high voltage devices within the new substation shall be with the Requestor.

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2.9 Qualified Change [FAC-001-4 Technical Rationale and Justification]

Prior to making any change, an existing Interconnection customer shall first request that GRDA evaluate whether such proposed modification is a "Qualified Change" that would require additional study. The term "qualified change" is defined and published by Southwest Power Pool, GRDA's Planning Coordinator.

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3 Reference

3.1 Definitions

Corporate Definitions:

GRDA > Policies > Compliance Resources > 4001 Corporate Definitions

Southwest Power Pool:

Qualified Change:

- SPP Planning Criteria (as revised)

Concept of Service (COS): A preliminary planning document developed by GRDA that identifies one or more technically feasible approaches for serving a proposed interconnection. A Concept of Service may identify alternative points of interconnection, transmission configurations, required facilities, preliminary cost estimates, and planning considerations. A Concept of Service is intended solely to support engineering evaluation and customer discussions and does not constitute approval of an interconnection or commitment by GRDA to construct any facilities.

3.2 Acronyms

NERC Acronyms

- NERC: North American Electric Reliability Corporation
- BES: Bulk Electric System
- BPS: Bulk Power System and/or Bulk-Power System
- OATT: Open Access Transmission Tariff
- SCADA: Supervisory Control and Data Acquisition

Other Acronyms

- GRDA: Grand River Dam Authority
- SPP: Southwest Power Pool
- GIP: Generator Interconnection Procedures
- MW: Megawatts
- MVAR: Megavars
- BIL: Basic Insulation Level
- COS: Concept of Service

3.3 Related Documents

Southwest Power Pool:

- [SPP Planning Criteria](#) (as revised)
- Section 5.2 Definitions
- [SPP Effective Planning Criteria](#) (as revised)
- Criteria 8 “System Protection Requirement”
- [SPP RC Outage Coordination Methodology](#) (as revised)

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- [FAC-001-4 Guidelines and Technical Rationale](#)

GRDA Documentation:

- 6100 Facility Interconnection Requirements Process
- GRDA Terms and Conditions of Service

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3.4 Forms

GRDA Forms:

- 6110A **Initial Interconnection Request Notification** Form
- 6110B ***Required Data For Facilities Interconnections*** Form
- 6110C **Load Ramp Table** Form

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4 Appendices

4.1 Appendix A - GRDA Metering Requirements for Transmission Interconnection Facilities

GRDA METERING REQUIREMENTS FOR TRANSMISSION INTERCONNECTION FACILITIES

PURPOSE

This document is intended to specify the applicable Grand River Dam Authority (GRDA) metering requirements for all transmission interconnection facilities connecting to the GRDA transmission system. The three types of connection requests addressed include: **Generator Connection (GC)**, **Transmission Interconnection (TI)**, and **End-User Connection (EUC)**.

This policy regarding metering of interconnection facilities shall be documented and published within GRDA's Facility Connection Requirements Process in accordance with NERC Reliability Standard FAC-001-1.

APPLICABLE REFERENCES/STANDARDS

Market Protocols SPP Integrated Marketplace – Appendix C - Meter Technical Protocols

ANSI C12.1 American National Standard for Watthour Meters, Code for Electricity Metering

ANSI C12.20 American National Standard for 0.2 and 0.5 Accuracy Class

IEEE C57.13 IEEE Standard Requirement for Instrument Transformers

METERING

A. General

1. An interconnection metering system generally includes instrument transformers (Current Transformers (CTs) and Voltage Transformers (VTs)), meters, test switches, and auxiliary equipment and wiring as necessary in a dedicated metering panel or enclosure.
2. All transmission facility connections to GRDA's system at transmission voltage levels will require metering at the same transmission voltage level.
3. For EUCs above 100kV, GRDA may, at its sole discretion, allow low voltage metering with appropriate correction factors for electrical losses to the point of interconnection (POI) between GRDA and the connecting facility.
4. Unless otherwise allowed within the interconnection agreement between the parties, GRDA will install, own, operate, and maintain the metering system equipment.
5. The initial installation costs and any recurring operation or maintenance charges, including upgrades, for the metering system shall be reimbursed by the GC, TI or EUC party.
6. Meters utilized shall meet applicable sections of ANSI 12.1 and ANSI 12.20.
7. Any connecting party that will be a market participant will require metering of sufficient quality to meet the requirements as defined by the SPP Market Protocols and Open Access Transmission Tariff (OATT). To the extent that GRDA's requirements herein regarding

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interconnection metering conflicts with the applicable SPP document, such SPP document shall control.

B. Metering Equipment Maintenance & Testing

1. Unless otherwise stated in the interconnection agreement, GRDA will test each interconnection meter at least once every 12 months and make test results available to each affected party. If the GC, TI, or EUC entity requests additional testing other than GRDA's normal test cycle, and the energy metering is found to be within tolerance, this additional testing shall be performed at the requestor's expense.
2. If the metering system fails, the energy transfer shall be determined by the best available data. This alternate data may include real-time metering, back-up/check metering, or historical metering data.
3. Metering accuracy of +/- two tenths percent (0.2%) shall be maintained. If inaccuracy in excess of +/- 0.2% is determined during any meter test, any billing adjustment for same shall be per the terms of the interconnection agreement.

C. Instrument Transformers

1. Each metering system shall include three CTs and three VTs for metering real and reactive power and energy at the point of interconnection. For new installations, no protective relays will be allowed in the same instrument transformer circuit with interconnection metering. Where protection and metering share instrument transformers on existing installations, GRDA is actively working to eliminate such arrangements.
2. Current transformers used for interconnection metering shall meet or exceed an accuracy class of 0.3 (as defined in IEEE 57.13) for all burdens. Current transformers shall have a thermal rating factor of 2.0.
3. Voltage transformers used for interconnection metering shall meet or exceed an accuracy class of 0.3 (as defined in IEEE 57.13) for W, X, M, Y, Z, and ZZ burden levels. Only wire wound voltage transformers shall be used.

D. Telecommunications

1. At the expense of the GC, TI or EUC party, GRDA shall provide communications facilities sufficient to meet GRDA metering, system protection, and Supervisory Control and Data Acquisition (SCADA) requirements.
2. A GRDA compatible SCADA remote terminal unit (RTU) will be required for any new transmission interconnection.
3. In addition to metering data, the extent of telemetry data and control required will be based on the needs of the GRDA System Operator and the Balancing Authority to fulfill operational and control requirements defined in agreements between GRDA, SPP and the GC, TI or EUC party.

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5 Document Control

5.1 Revision History

REVISION HISTORY GRDA Internal Compliance Program			
Version	Brief Description of Changes Made:	Date	Last Name
1.00	Initial version Retired the previous 6110 document and created this document as the Interconnection Requirements This document created in response to the implementation of FAC-001-2	12/16/2015	Tullis/Kegley
2.00	Updated contact information Executed a New Signed Version during Annual Review and Approval	12/08/2016	Tullis/Kegley
3.00	Updated Grant Burget to Cameron Philpott Modified Minimum Lagging Power factor. Executed a New Signed Version during Annual Review and Approval	12/15/2017	Tullis/Kegley
4.00	Formatting Updated SharePoint paths Executed a New Signed Version during Annual Review and Approval	12/13/2018	Tullis/Sabin
5.00	Section(s) 2.8.2 & 3.2 updated reference to SPP RC Outage Coordination Methodology Executed a New Signed Version during Annual Review and Approval	10/02/2019	Tullis/Sabin
5.10	Section 2.3 & 2.4.3: Updated the SPP etariff links Minor Revision Executed a New Signed Version during Annual Review and Approval	11/17/2020	Tullis/Sabin

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5.20	Section 2: Updated Jeff Tullis Email Minor Revision Executed a New Signed Version during Annual Review and Approval	12/21/2021	Tullis/Sabin
6.00	Throughout: Document Ownership Change – Jeff Tullis to Steven Kroll Chief Engineer is now Sr. Manager, T&D Engineering 6110A and 6110B forms updated Executed a New Signed Version during Annual Review and Approval	11/17/2022	Tullis/Kroll/ Sabin
7.00	New Standard from FAC-001-3 to FAC-001-4 Throughout: “Materially Modified” changed to “Qualified Change” Executed a New Signed Version during Annual Review and Approval	10/11/23	Kroll/Van Natta
8.00	Subsection 2.4.3: Removed references specifying the section number within documents that are under the custody and control of third parties, to avoid legacy issues. Subsections 2.6.1, 2.6.2, and 2.6.3: refined language to bring greater clarity and specificity to the scope of the process; resulting in six (6) correlative and compatible subsections (subsections 2.6.1 - 2.6.6). Subsection 3.2: Added related document: Facility Interconnection Studies and Requirements. Updated SharePoint paths. Executed a New Signed Version during Annual Review and Approval.	09/30/2025	Kroll/McIntire
9.0	Readability edits throughout Subsection 2.7 & 2.8 Revised for updated study process. Subsection 2.9 edited to avoid future legacy issues	07/30/2026	Kroll /McIntire /Glaze

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	Defined Concept of Service (COS) as a formal planning product. Subsection 2.5 Renamed 6110B SPP AQ Form to 6110B <i>Required Data For Facilities Interconnections Form; included the 6110C Load Ramp Table Form</i>; and formatting for clarity Sr. Manager, T&D Engineering is now Director, Power Systems Engineering		
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5.2 Review History

ANNUAL REVIEW AND APPROVAL GRDA Internal Compliance Program		
Date	Description	Name
12/16/2015	Initial Signing	Jeff Tullis
12/08/2016	Annual Review and Approval	Jeff Tullis
12/15/2017	Annual Review and Approval	Jeff Tullis
12/13/2018	Annual Review and Approval	Jeff Tullis
10/02/2019	Annual Review and Approval	Jeff Tullis
11/17/2020	Annual Review and Approval	Jeff Tullis
12/21/2021	Annual Review and Approval	Jeff Tullis
11/17/2022	Annual Review and Approval	Steven Kroll
10/11/2023	Annual Review and Approval	Steven Kroll
10/01/2024	Annual Review and Approval	Steven Kroll
09/30/2025	Annual Review and Approval	Steven Kroll
07/30/2026	Annual Review and Approval	Steven Kroll