



**PLATTE RIVER
POWER AUTHORITY**

Requirements for Interconnection to the Platte River Power Authority Transmission System

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Definitions

In this document, certain words are identified as having specific meanings. Capitalized terms in the Requirements for Interconnection to the Platte River Power Authority (Platte River) Transmission System shall bear the meaning set forth herein:

Balancing Authority: The responsible entity that integrates resource plans ahead of time, maintains load-interchange-generation balance within a Balancing Authority area, and supports interconnection frequency in real-time. Public Service Company of Colorado (PSCo) is the Balancing Authority for Platte River.

Bulk Electric System: As defined by the most current version of the Glossary of Terms Used in NERC Reliability Standards.

Emergency Operating Condition: A condition or situation: (1) that in the judgment of the party making the claim is imminently likely to endanger life or property; or (2) that, in the case of a Transmission Service Provider, is imminently likely (as determined in a non-discriminatory manner) to cause a material adverse effect on the security of, or damage to the Transmission Service Provider's Transmission System, or the electric systems of others to which the Transmission Service Provider's Transmission System is directly connected; or (3) that, in the case of interconnection customer, is imminently likely (as determined in a non-discriminatory manner) to cause a material adverse effect on the security of, or damage to, the facility. System restoration and black start shall be considered Emergency Operating Conditions.

Facilities Study: A study conducted by Platte River or its third party consultant to determine a list of facilities, the cost of those facilities, and the time required to interconnect with Platte River's Transmission System.

Interconnection Party: Party requesting to interconnect with the Platte River Power Authority Transmission System.

Point of Interconnection (PoI): The point where the Interconnection Facilities connect to the Transmission Provider's Transmission System.

Protection System: As defined by the most current version of the Glossary of Terms Used in NERC Reliability Standards.

Queue Position: The order of a valid interconnection request, relative to all other pending valid interconnection requests, that is established based upon the date and time of receipt of the valid interconnection request by Platte River.

Regional Entity: The regional reliability organization applicable to the Transmission System which the Facility is directly interconnected, presently the Western Electricity Coordinating Council (WECC) for Platte River's Transmission System.

Reliability Standards: The requirements and guidelines of NERC and the Regional Entity of the Transmission System to which the Facility is directly interconnected.

System Impact Study: An engineering study conducted by Platte River or its third party consultant that evaluates the impact of the proposed interconnection on the safety and reliability of Platte River's Transmission System and neighboring transmission systems. The study shall identify and detail the system impacts that would result if the facility were interconnected without project modifications or system modifications, focusing on the adverse system impacts.

Transmission Service Provider: The entity that administers the transmission tariff and provides transmission service to transmission customers under applicable transmission service agreements.

Transmission System: The facilities owned, controlled or operated by Platte River that are used to provide transmission service under the Tariff.

Introduction

Platte River Power Authority (Platte River) is a political subdivision and public corporation of the State of Colorado, established as a separate entity by Colorado State Legislation in 1973 for the benefit and purpose of supplying electric energy and services to the cities of Loveland, Longmont, Fort Collins, and Estes Park Colorado.

Platte River acts as a wholesale electric utility, acquiring, constructing and operating generation capacity and supplying electric energy on a requirements basis to its owner cities in Northern Colorado.

Platte River's 115kV and 230 kV transmission network operates as part of the Western Interconnection and Platte River is a member of the Western Electricity Coordinating Council (WECC), one of eight North American Electric Reliability Corporation (NERC) Regional Entities. WECC is geographically the largest and most diverse of the eight Regional Entities that have Delegation Agreements with the North American Electric Reliability Corporation (NERC). WECC's service territory extends from Canada to Mexico. It includes the provinces of Alberta and British Columbia, the northern portion of Baja California, Mexico, and all or portions of the 14 Western states between.

Purpose

This document describes the requirements for interconnection with the Platte River transmission system. These requirements promote safe operation, system integrity, reliability and compliance with national and regional Reliability Standards, and guarding against adverse impacts on other customers and utilities. There may be additional requirements by Platte River depending upon the location and scope of the proposed interconnection. The interconnections include facility additions and modifications to accommodate generation, transmission and end-user load facilities.

By maintaining and publishing these Interconnection Requirements Platte River ensures compliance with the requirements of NERC Reliability Standard FAC-001 - Facility Connection Requirements.

Interconnection Request Procedure

Each request for interconnection is evaluated on a case-by-case basis and is subject to meeting reasonable needs of the Interconnection Party. All costs to interconnect with Platte River's transmission system are the responsibility of the Interconnection Party.

The Interconnection Party shall start the interconnection procedure by contacting Platte River Power Authority and submitting an application. System Impact Studies will be required to evaluate the impact of the requested interconnection and, if needed, develop alternative plans to meet established reliability criteria. After completion of the System Impact Studies, a Facilities Study will be required to determine the detailed facility interconnection requirements. The Facilities Study will address, at a minimum, voltage level and MW and MVAR capacity or demand at point of connection, direct assignment facilities, network upgrades, cost estimates and construction scheduling estimates. All arrangements for system studies, engineering design,

construction, ownership, operations, maintenance, replacement equipment, metering, facility controls and telecommunications must be set forth in an Interconnection Agreement between Platte River and the requesting party. The requesting party will generally be responsible for obtaining any necessary right-of-way or easements from landowners as well as, all environmental activities for the new facility. Specific details for the interconnection process may be found in Platte River's Interconnection Request Procedure.

Planning and Coordination Requirements

Interconnections to the Platte River transmission system must be consistent with regional reliability requirements and standard utility practices. A proposed interconnection must not degrade the reliability or operating flexibility of the existing transmission system. Platte River assumes responsibility to operate and maintain its interconnected facilities in accordance with regional planning and operating standards.

Procedures for Coordinated Studies

Platte River's Reliability Criteria and Assessment Practices for Transmission Studies will be utilized for coordinated studies of new or materially modified existing interconnections and their impacts on affected system(s).

Procedures for Notifications

Platte River, after execution of a PRPA System Impact and Facilities Studies Agreement with the Interconnection Party to conduct a system impact study will contact all entities who own or are responsible for the reliability of systems which could be affected by the proposed interconnection. Platte River or its third party consultant will coordinate study efforts with all entities affected. Once studies are completed, Platte River will notify those responsible for the reliability of affected system(s) of the impact the new or materially modified existing interconnection would cause to their system(s).

Ownership, Operation

Platte River will normally own, operate and maintain all transmission facilities constructed for the interconnection of a requesting party's transmission facilities to the Platte River Transmission System. Platte River shall own all Platte River facilities and upgrades that Platte River determines that it is appropriate to own. This includes, but is not limited to, meters, Protection Systems, RTU, communication systems, and all Bulk Electric System (BES) related equipment. Platte River may, at its option, contract with the requesting party or a third party for construction of any or all of these facilities.

If the Interconnection Party plans to contract with Platte River to operate or maintain the facilities, specific design considerations may be required that go beyond the minimum technical requirements described in this document. To ensure the safety of Platte River personnel and to minimize the opportunity for human error, the requesting party may be required to use certain Platte River design standards and criteria or certain approved equipment manufacturers. The Interconnection Party will be required to maintain their own stock of any necessary spare/emergency parts and make them available to Platte River maintenance personnel or contract employees. All equipment, whether provided by Platte River or the Interconnection Party, must conform to the technical specifications of these requirements.

Regulatory Approvals and Permits

Interconnection facilities and system upgrades typically require permits and regulatory approvals. The schedule for interconnection and commercial operation of a new interconnection depends on obtaining regulatory approvals and permits for construction of required facilities. The Interconnection Party is responsible for obtaining all required permits and regulatory approvals for its interconnection facilities. Platte River may be responsible for obtaining approval for the permits and regulatory approvals necessary for any required system upgrades to Platte River facilities.

The Interconnection Party will be responsible for the costs incurred by Platte River for these permits and regulatory approvals. In addition, regulatory approvals may be required to be obtained by owners of neighboring systems if the interconnection facilities make it necessary for system upgrades to be constructed on neighboring systems.

Standards Compliance

NERC has established Reliability Standards and practices for the reliable design and operation of the electric transmission system. NERC and the individual Regional Entities revise their Reliability Standards and criteria from time to time. The Interconnection Party should consult the websites of NERC (www.nerc.com) and the applicable Reliability Entity, WECC (www.wecc.biz) to ensure that the most up-to-date Reliability Standards are used in the project design, operation and maintenance requirements. For purposes of compliance with NERC and WECC Reliability Standards, Platte River will be responsible for compliance for the facilities it owns while the Interconnection Party will be responsible for compliance for the facilities it owns unless otherwise agreed to in writing.

American National Standards Institute (ANSI) and Institute of Electrical and Electronic Engineers (IEEE) standards also affect transmission interconnections and are mentioned in these requirements. ANSI and IEEE revise these standards from time to time. The Interconnection Party should plan its interconnection using the latest revision of referenced ANSI/IEEE standards.

Open Access Transmission Tariffs (OATT)

Transmission service is a separate process and not part of the interconnection request procedure. Transmission service requests must be made in accordance with OATT. The OATT and the requirements to become a transmission customer are posted on the Platte River Open Access Same-Time Information System (OASIS) website at www.oatioasis.com/PRPA.

Facility Connection Requirements

Interconnection to Platte River's transmission facilities will be consistent with Platte River's Mission, Platte River's Reliability Criteria and Assessment Practices for Transmission Studies, OATT (when applicable), and prudent utility practices. A proposed interconnection must not degrade the reliability or operating flexibility of the existing power system, and must meet the NERC and WECC Reliability Standards and Criteria. When involving Platte River owned, operated or maintained facilities, the interconnection must also comply with Platte River Engineering Department requirements.

The interconnecting entity will be responsible for data submittals, testing and reporting requirements for its facilities including but not limited to Platte River, applicable Balancing Authorities, Reliability Coordinators, Regional Entities, NERC, and Federal Energy Regulatory Commission (FERC) in accordance with applicable Reliability Standards, or other criteria.

Platte River will retain equivalent transmission capacity and operational control as previously existed. Platte River reserves the right to participate in the costs of proposed projects that may be accommodated through mutually advantageous alternatives which provide substantial benefits to regional reliability or transmission transfer capability.

Interconnection Technical Requirements

The requirements in this document apply to Transmission interconnections with the Platte River System. Please contact Platte River with any questions regarding these requirements. Contact information can be found on the Platte River OASIS Home Page.

Transmission Interconnection Substation Configuration

The Interconnection Party's transmission facilities may interconnect at a Platte River substation or via a tap into a Platte River transmission line. The configuration requirements of the interconnection depend on where the physical interconnection is to occur and the performance of the system with the proposed interconnection.

Platte River uses either a ring bus or a breaker-and-a-half bus design configuration. If the Interconnection Party interconnects to an existing Platte River substation, the interconnection must conform, at a minimum, to the original designed configuration of the substation. Generally, Platte River will not allow a ring bus of greater than six breakers. Adding a seventh breaker will require conversion of the station into a breaker-and half bus design. Platte River, at its sole discretion, may consider different configurations due to physical limitations at the site.

Typical interconnection configuration diagrams can be found in **APPENDIX A and B**. The figures represent generic installations. Circumstances unique to each installation may cause the final configurations to differ significantly from the examples shown. In any case, the Facilities Study will determine final configuration of the Interconnecting Facilities.

The Interconnection Facilities configuration will be allowed only if it does not jeopardize the transmission system's ability to operate reliably and safely during normal and emergency conditions and maintenance activities. Any circuit breaker or switch that can directly impact the reliability and the security of the Platte River System will normally be under the sole ownership and control of Platte River. In some cases, this will require the installation of an additional breaker in the facility of the Interconnection Party in order for the Interconnection Party to exercise maintenance control, ongoing operational control, and personnel safety.

Protective Devices

The Interconnection Party is responsible for the overall safe and effective operation of their transmission facilities. Certain protective devices (relays, circuit breakers, etc.) that are specified by Platte River must be installed at the location where the Interconnection Party desires to connect with the Platte River System. The purpose of these devices is to promptly disconnect the Interconnection Party's transmission facilities from Platte River's System whenever faults or abnormal operating conditions occur. Other modifications to the electrical system configuration or protective relays may be required in order to accommodate the transmission interconnection.

Platte River will not be responsible for primary protection of equipment in the Interconnection Party's substation or Transmission Facility. Protective devices (e.g. relays, circuit breakers) must be installed by the Interconnection Party to the full extent required by all applicable standards to disconnect the Interconnection Party's transmission facilities from the Platte River System whenever a fault or abnormality occurs (including local breaker-failure tripping whenever the normal relaying does not work). Such equipment must be coordinated with existing Platte River equipment and provide comparable levels of protection as practiced on Platte River's System. The protective devices differ with the size of the installation. The specific requirements will be determined in the Interconnection and Facilities Studies. Major factors generally determining the type of protective devices required include:

1. The type and size of the Interconnection Party's transmission equipment.
2. The location and system voltage level of the Interconnection Party's connection to Platte River's System.
3. The manner in which the installation will operate (one-way versus two-way power flow).

However, this Guideline does not address all of the nuances and complexities involved in designing a protection scheme or for integrating additional transmission facilities into an interconnected electric transmission system. The Interconnection Party is responsible for

designing their own protection scheme and should consult an expert in the field of system protection, Transmission controls, etc.

Specific protective device requirements are described in **APPENDIX C**.

Interference

Operation of the transmission interconnection by the Interconnection Party must not cause unusual fluctuation or disturbance on, or inductive interference with the Platte River system or neighboring systems. If such fluctuations or disturbance occur, the Interconnection Party will be required to install suitable apparatus to reasonably correct or limit such fluctuation, disturbance, or interference at no expense to Platte River or Platte River's other Interconnection Parties or customers.

Switching Criteria

Switching of reactive control devices (shunt capacitor banks, shunt reactors, etc.) must not result in a steady-state voltage change of more than 2%.

Voltage Fluctuations (Flicker) and Harmonics

The interconnection of the Interconnection Party's transmission facilities with Platte River's System shall not cause any reduction in the quality of service on the Platte River System or neighboring systems. No abnormal voltages, frequencies, or interruptions will be permitted. If high-voltage or low-voltage complaints, transient voltage complaints, and/or harmonic (voltage distortion) complaints result from operation of an Interconnection Party's transmission facilities, the Interconnection Party's transmission facilities may be disconnected from Platte River's System until the Interconnection Party resolves the problem. The Interconnection Party is responsible for the expense of keeping their equipment and facilities in good working order so that the voltage, harmonics, power factor (PF), and var requirements are always met. The interconnecting customer is expected to provide for its systems own reactive power requirements and not place an undo burden on the Platte River system.

For transmission interconnection facilities that include a shunt capacitor bank, static var compensation, underground cable, shunt reactor, or other reactive devices, a high-frequency transient analysis using an Electromagnetic Transient Program (EMTP) will usually be required to analyze the switching impacts on equipment ratings and power quality. Platte River will retain a consultant for the EMTP studies and the Interconnection Party will be responsible for the expense.

Voltage Fluctuations (Flicker)

Customer loads are not allowed to produce voltage fluctuations, as defined and discussed in IEEE 519 and IEEE 1453, that adversely impact adjacent customers and producers or that exceeds the limits as defined in **APPENDIX D**. This flicker criteria generally conforms with the flicker limits defined in Section 10.5.1 of IEEE Std. 519-1992.

In some cases, depending on the proximity of sensitive loads, it may be necessary to restrict the maximum allowable voltage fluctuation to no more than 2%. The Customer will be responsible for corrections if their facility is the cause of objectionable voltage fluctuations. In addition, where starting or energizing Customer load or equipment will have an adverse impact on Platte River's System voltage, corrective measures may be required on the part of the Customer to limit the voltage changes.

Harmonics

The Interconnection Party shall not be allowed to introduce excessive distortion to the Platte River System's voltage and current waveforms per the most current revision of IEEE Standard 519. The total harmonic distortion (THD) measurements shall be made at the Point of Interconnection (PoI) between the Customer and the Platte River System and be within the limits specified in IEEE Standard 519. The THD limit is 1.5% at a 230 kV bus and 2.5% at a 115 kV bus. THD is equal to the square root of the sum of the squared harmonic voltages,

divided by the magnitude of the fundamental voltage. Platte River advises the Customer to account for harmonics during the early stages of planning and design.

Steady-State and Dynamic Performance Criteria

See Platte River's Reliability Criteria and Assessment Practices for Transmission Studies for the steady-state and dynamic reliability performance criteria used in transmission studies.

Frequency and Frequency Control

The energy delivered to Platte River's System must be 60 Hz sinusoidal alternating current at a standard voltage and phase rotation. Platte River's phase rotation is ABC counter-clockwise.

Power Factor

All interconnections will be reactive compensated pursuant to good utility practice to ensure proper operation of the interconnection. Interconnection Party must provide their own reactive support for their transmission facilities such that the power factor of the interconnection is maintained between 0.95 lagging and 0.95 leading.

Fault Current

Platte River's protective equipment fault current capability is based on the use of equipment with greater capability than the maximum fault current available at a location. The Interconnection Party's equipment capability must exceed the maximum fault current available. On the Platte River System, equipment fault current capability must be at least 40,000 amps. The exact value of available fault current depends upon location and circuit configuration and will be determined in the Facilities Study. The Interconnection Party must work closely with Platte River at the time of the interconnection design to determine the available fault current at the specific location of interconnection. In addition this value may increase over time due to growth and changes in the interconnected power system. Therefore, the Interconnection Party should make accommodations for reasonable increases in fault current in designing its Facility.

Disconnect Device/Point of Demarcation

A disconnect device must be installed to isolate Platte River's System from the Interconnection Party's facility. This disconnect shall be installed and owned by the Interconnection Party and shall provide a visible air gap to establish required clearances for maintenance and repair work of the Platte River System. Platte River does not consider the integral switch available on some circuit-switchers as an acceptable way to meet this requirement. Platte River may require the design to allow the application of personnel safety grounds on Platte River's side of the disconnect device.

The disconnecting device must be accessible at all times to Platte River personnel. The disconnects should have the capability to be padlocked in the open and close position with a standard Platte River padlock. The Interconnection Party shall not remove any padlocks or Platte River safety or clearance tags. The Interconnection Party must provide access to disconnect at all times (24 hours a day telephone number, guard desk, etc.). The disconnecting equipment must be clearly labeled. The disconnecting equipment shall be approved for the specific application and location.

Effective Grounding

Platte River maintains effective grounding on its transmission systems, as defined by IEEE 142. All Interconnection Party facilities connected to Platte River's System must be effectively grounded per the IEEE 142 requirement. These calculations should be made as if the Platte River system was disconnected from the Interconnection Party (The Interconnection Party must meet the effective grounded system criterion independent of the Platte River system).

IEEE 142 requires that: The positive sequence reactance is greater than the zero sequence resistance ($X1 > R0$); and the zero sequence reactance is less than three times the positive sequence reactance ($X0 < 3X1$).

Equipment, Protection and Control Requirements

This section indicates the minimum Platte River design requirements for transmission facilities interconnecting to the Platte River transmission system. Any facilities constructed by the interconnection customer that will be ultimately owned by Platte River shall be designed using Platte River substation and transmission design criteria and material standards, which will be made available upon request. The interconnecting party must communicate and coordinate its system equipment, and protection and control designs and settings with the Platte River engineering staff.

Fault Clearing and Breaker Duty

1. A fully rated circuit breaker is normally required to be installed at the Pol. Sync-check relay(s) must be installed with the circuit breaker to ensure synchronous closing. Breaker failure relaying shall also be included. Circuit breakers shall meet the latest applicable ANSI and IEEE standards and shall be suitable for the local environment and system operating conditions. Circuit breakers must be capable of interrupting present and future available fault current at the location at which they are being installed. Fault currents will increase on the Platte River system over time, the Interconnection Party needs to periodically check fault levels to ensure their breaker meets these ever increasing values. It is presumed that the installation meets the NEC/NESC certified by appropriate authorities to ensure safety of Platte River personnel.
2. Application of ground-switches to trigger remote tripping is not an acceptable practice. Faults in the Interconnection Party's network must not trip existing transmission lines as a primary protection method.
3. The Interconnection Party must immediately and automatically isolate any faulted or failed Equipment from the Platte River System. This automatic equipment must be compatible with the existing transmission protection equipment.

Platte River will require approval only for those portions of the Interconnection Party's design that pertain directly to the protection of Platte River System. Platte River may make suggestions or comments on other areas; however, the Interconnection Party is responsible for the design of protection schemes associated with their transmission facilities.

Utility Grade Relays

Utility grade protective and control relays are required for all transmission facilities interconnected to the Platte River System. The applicable relays are described in the next section (Minimum Protection Requirements) or as designated by the Facilities Study. The relays must:

1. Meet or exceed ANSI/IEEE Standards for protective relays (i.e., C37.90, C37.90.1, C37.90.2 and C37.90.3).
2. Have documentation covering application, testing, maintenance, and service.
3. Give positive indication of what caused a trip (Targets and or Relay Event Reports).
4. Include FT-1 switches which are required to facilitate testing.

The Interconnection Party is required to use microprocessor-based protective relays. The self-diagnostic abilities, the sequence of events capabilities, and the increased flexibility of application are highly desirable. Platte River may require that microprocessor style relays be utilized for certain interface relay applications.

Minimum Protection Requirements

1. The following functions are required as a minimum to protect Platte River's equipment. The Facilities Study will determine specific protective requirements.
 - a. Over-voltage (59).
 - b. Under-voltage (27).
 - c. Sync relay (25)
 - d. Over/Under Frequency (81O/81U).

- e. Three zone Distance, Phase and Ground, (21). On short transmission lines current differential relay(s) may be substituted.
 - f. Breaker Failure.
 - g. Transfer-Trip (TT).
2. The following additional protection functions may be suggested or required depending upon the nature of interconnection and coordination requirements with the Platte River Protective Systems:
- a. Out-of-Step (68).
 - b. Directional Overcurrent (67).
 - c. Disturbance Recorder.
 - d. Power Quality Meter

Redundant/Backup Protection

Relays protecting the Platte River system shall be designed to ensure that the failure of a single protective relay will not result in failure to clear the fault. Failure to trip during fault or abnormal system conditions due to relay or breaker hardware problems or from incorrect relay settings, improper control wiring, etc. is always a possibility. The design shall provide the necessary backup that will meet the Platte River standards and regional protection requirements.

Synchronization

Platte River requires sync-check relays to be installed on all circuit breakers interconnecting the transmission facilities to Platte River’s transmission system. These relays, with additional voltage monitoring functions, will supervise the closing of the circuit breaker.

Manual closing of circuit breakers requires verification of synchronism to prevent out of synchronization closing. If a circuit breaker is also the point of generator synchronization, it is highly recommended to install additional automatic synchronizing equipment.

Station Power/Station Services

The Interconnection Party is responsible for providing a source of AC station power for the interconnection facility.

The Interconnection Party will be expected to match the regional Station Service voltage in use by Platte River. The three most common voltages are: 1) 120/240 VAC single phase, three wire; 2) 120/208 VAC three phase, four wire; and 3) 120/240 VAC three phase, four wire.

Grounding System

The Interconnection Party is responsible for the appropriate safety grounding of their equipment. At the point of interconnection, the Interconnection Party’s grounding equipment must be compatible with Platte River’s grounding equipment. The Interconnection Party shall submit the grounding system study and design for Platte River review prior to construction. The ground grid design must comply with IEEE 80 and properly address site extremes. Site tests should be completed to determine soil resistivity prior to ground grid design. Platte River grounding standards may be available upon request.

Communication Channel(s)

Platte River may require that a communication channel and associated communication equipment be installed as part of the protective scheme. This channel may consist of fiber optic cable or microwave radio. Communication channels may be needed for telemetry, SCADA, monitoring, relay/fault recorders, metering, or protection/control purposes. The Facilities Study will determine the specific communication channel requirements.

Metering and Telemetry

The interconnection shall require metering installed such that the delivery of power between the Interconnection Party and Platte River System can be determined. The metering installation shall be of billing accuracy. The metering installation will be owned and maintained by Platte River. The metering installation includes the CTs, VTs, meter, recorder, remote communication rack,

and any auxiliaries required. Platte River may require in special circumstances, a readily available power quality meter (a.k.a. power quality monitor) be installed. Balancing Authority Area boundaries may require additional metering including, but not limited to a RTU or Dual-Port RTU for Balancing Authority Area metering Interchange.

Supervisory Control and Data Acquisition (SCADA)

Platte River may require that the Interconnection Party substation(s) with a 115 kV or greater voltage circuit breaker provide remote control of the circuit breaker to the Platte River Control Center. The equipment data and statuses, which are to be provided, as applicable, include, but are not limited to what may be provided:

- a. Breaker position.
- b. Bus voltage and alarming.
- c. Loss of AC and DC voltage alarms.
- d. Transmission Line MW and MVar values and Amps.
- e. Lockout relay status.
- f. Other control and data points as necessary to provide comparable control and indication to Platte River control standard.
- g. Digital Fault (Transient)/Dynamic recorder trouble alarm.
- h. Protective Relay malfunction alarms.
- i. Energy accumulator or integrator.
- j. Various alarms associated with substations

Voltage and BIL Values

The Interconnection Party must ensure that all equipment is adequately protected from excessive system over-voltages. This includes selection of equipment Basic Impulse Insulation Level (BIL) and protective devices (e.g. surge arresters) to achieve proper insulation coordination and Surge Protections. The addition of new transmission facilities to Platte River’s System in general should be modeled, and Transient Network Analysis (TNA) or Electromagnetic Transients Program (EMTP) studies may be required. The Facilities study will identify whether these detailed studies are required. If so these studies should be completed before other major engineering work on the project commences. The following table indicates voltage and BIL levels found on most of the Platte River transmission system.

Voltage and BIL Levels Currently In Use In Typical Platte River Substations:

Nominal System Voltage	Maximum System Voltage	Basic Insulation Levels*
115	121	550
230	242	900

* Expressed in kV crest value of withstand voltage of a 1.2 x 50 microsecond full impulse wave. Values provided are for the non-arrester protected devices such as breaker bushings. BIL levels may increase depending on an EMTP study if one is required.

Acceptance Testing and Inspection Requirements

Platte River requires all Interconnection Parties proposing to interconnect to the Platte River System be in compliance with the applicable testing and/or performance requirements.

General

Prior to energizing the interconnection equipment with the Platte River System, all pertinent contracts must be signed and all equipment modifications must be complete. The Interconnection Party is required to demonstrate the correct operation of all interface protective and control devices to Platte River. Platte River shall define and witness, but is not responsible for the applicable testing and/or performance testing.

The Interconnection Party must provide detailed information on the protective relaying, metering, and control (including sync-check) equipment that will interface with the Platte River System. This is usually provided on a relaying and metering one-line (and possibly a three-line) diagram. Basic proposed AC and DC schematics or specification of logic may also be provided at this time. This information is required 90 days before the Interconnection Party in-service date, along with a listing of the specific relays, etc., including information on the manufacturer, model number, relay ranges, etc. Platte River requires at least two sets of any design documentation packages sent. If any subsequent changes are made, the Interconnection Party shall provide Platte River a set of revised one-lines, schematics, construction drawings, etc. Based on this information, Platte River will develop and deliver to the Interconnection Party the required demonstration test details within 30 days after receipt of information from Interconnection Party. A coordination meeting shall be held with Platte River and the Interconnection Party to clarify any questions that may exist before testing begins. The Interconnection Party is also required to hold a coordination meeting with the Platte River to establish a specific switching sequence for the initial energizing of the Interconnection Facilities. The switching procedure will include a sign-off provision for the Interconnection Party.

Scheduling of demonstration testing should be coordinated through Platte River in accordance with Platte River's outage notification requirements. All testing shall be completed at least seven (7) days prior to the planned in-service date to provide time to resolve problems identified during testing. If no problems are identified then the equipment can be placed in service without delay. Based on the location and type of interconnection, Platte River may, at Platte River's sole discretion, require only a design and relay settings review and not require a site visit. The Interconnection Party shall be responsible for coordinating their relay settings with Platte River and other affected entities. At least forty-five (45) days before startup testing, the Interconnection Party must supply the proposed settings for the relays, including support documentation (e.g. calculations, fault studies, time over-current relay coordination curves, etc.).

The Interconnection Party shall supply certified test reports for Platte River's required protective relaying, interlocks, and any equipment directly connected to Platte River's System (Interconnection Party's transformers and/or breakers). Certified test reports shall be sealed by a registered Professional Engineer (P.E.). Platte River's personnel may require witnessing some or all of the tests, calibrations, and the relay setting applications. The final "as-built" documentation for the interconnection facilities, including all drawings and final "as left" relay settings, must be provided by the Interconnection Party to Platte River no later than 90 days after commercial operation commences.

The Interconnection Party must assign one qualified and proficient relay and controls person to be the main point of contact throughout the commissioning phase of the project. This person should have adequate field experience in relaying and control of high-voltage equipment as appropriate to the system they are working on. This person's experience should include polarity checks, phase-angle, relay calibration, and trip testing for multiple large projects. This person will also insure adherence to these Guidelines. The Interconnection Party must also provide qualified electricians, technicians, and operators to perform the demonstration testing. The Interconnection Party must supply all personal protective equipment and designate any procedures necessary to assure that safety precautions are taken while working near energized equipment.

Inspection and approval by Platte River does not constitute a warranty or relieve the Interconnection Party of responsibility for the operating condition or installation of the equipment, and may not be relied upon by the Interconnection Party for that purpose. Once the facility is interconnected, Platte River will retain the right to inspect the facility if the operation is suspected of causing problems for other Platte River facilities or customers and retains the right to inspect the facilities of the Interconnection Party at Platte River's discretion.

Demonstration

The Interconnection Party and Platte River shall follow the following steps in assuring that the new facilities have been adequately tested prior to energization.

1. Construction Testing Documentation Review

Field-testing of all electrical equipment must be completed prior to energization. This includes physical testing of equipment such as transformers and circuit breakers. This testing also includes setting and testing of relays and control systems, as well as verifying coordinated relay settings.

Reports for all tests performed must be submitted for approval to both parties. All revisions and changes found on field drawings shall be shown on the as built drawings and copies provided to both parties. A written record must be kept of all tests showing date, personnel performing test, signature or initial of person completing tests, equipment or material tested, results, and type of testing equipment used by manufacturer, model type, and model serial number. The test sheets must show all equipment nameplate data (including for all bushings and surge arresters).

Settings and programs must be downloaded from each relay and programmable logic controller after testing to retrieve all as-left-in-service settings and copied onto a USB drive or CD-ROM. For non-microprocessor-based relays, test sheets or reports for each device are to be completely filled out. All relay setting sheets are to be checked against as-left settings on the corresponding relay device and signed as being complete by the responsible technical person. The USB drive's and/or CD-ROM's, test sheets, reports, and settings are to be labeled with equipment identification numbers, relay type numbers, and relay device numbers.

2. DEMONSTRATION TESTS

Demonstration tests must be employed to ensure that each of the required protection systems and protective devices operate correctly. These tests are used to verify that the testing as indicated in the preceding paragraph has been completed. These tests also verify synchronizing equipment and the proper operation of the Platte River – Interconnection Party interface protective relays. Upon performance and certification of the Demonstration, the Interconnection Party will be granted approval for operation of their transmission facilities in parallel with Platte River's System. Unsuccessful demonstration may lead to delays in the Interconnection Party facility in-service date. Platte River and the Interconnection Party will develop an initial energization procedure at least two weeks prior to energization. If deemed necessary by Platte River, a meeting will be held on site within one week of the energization date to discuss any particulars of the initial energization.

The actual demonstration requirements will depend upon the final, approved AC/DC schematics, relay settings, etc. This demonstration is intended to be non-destructive. However, Platte River will not be liable for any equipment damage or injury resulting from the use of these guidelines. It is the responsibility of the Interconnection Party to demonstrate the operation of all protective devices in a safe manner and in a manner that does not adversely affect the Interconnection Party or any equipment on the Platte River System. Platte River recommends that similar tests be performed for the Interconnection Party's other relays to insure the adequacy of all protective relaying.

3. Pre in-service tests

Performance of Tests

The Interconnection Party must test all wire, cable, electrical equipment, and systems installed by the Interconnection Party or connected by the Interconnection Party to assure proper installation, adjustment, setting, connection, and functioning. The Interconnection Party must inform Platte River of any equipment or system that fails testing or that is deficient in any matter. The extent of testing where modifications are made to existing circuits shall be sufficient to check the entire

trip/control/CT/VT path as if it were new. Platte River will not be responsible for any damage to equipment or material due to Interconnection Party's inadequate, substandard, improper test procedures or test apparatus handling.

Platte River reserves the option to assign its personnel to assist the Interconnection Party in checking out certain control schemes where Platte River concludes such assistance is necessary to meet the project schedule. If Platte River should exercise this option, the Interconnection Party will be notified in advance of the extent of Platte River's involvement.

Platte River also reserves the right to shut down testing activities if, in Platte River's opinion or the opinion of Platte River's designated representative, the Interconnection Party is using unsafe practices or is in violation of applicable local, state, or federal safety regulations. Platte River requires compliance with the most conservative of the safety practices as provided by OSHA, NESC, or Platte River's safety practices whenever work is being performed in an energized facility.

Testing Equipment

The Interconnection Party must provide all equipment necessary to perform the tests required by Platte River. A list of testing equipment shall be submitted to Platte River for approval prior to the beginning of the testing. Test instrument type (manufacturer, type, serial number) and associated calibration certifications shall be submitted to Platte River prior to the commencement of any testing. The equipment certification shall be renewed at least annually and shall be traceable to the National Bureau of Standards.

Platte River will review the list and notify the Interconnection Party of any testing items that are not acceptable or are missing from the list. The Interconnection Party shall correct this deficiency prior to the start of testing.

Platte River Supplied Equipment

Any Platte River supplied equipment that is factory calibrated (transducers, , etc.) shall be tested to verify calibration. The Interconnection Party may not modify calibration settings without authorization from Platte River. If equipment does not meet specifications, the Interconnection Party should notify Platte River of the problem immediately. Platte River will then direct the Interconnection Party on how to proceed. If the Interconnection Party modifies factory settings without authorization, Platte River will not be responsible for any costs associated with repair, replacement, or re-calibration of the Interconnection Party's transmission facilities.

4. POST IN-SERVICE TESTS

Phase Angle Measurements

These tests are employed for verification of relay connections under actual load conditions. This is commonly known as "phase and load checking". These checks are completed by directly measuring actual operating quantities in differential, distance, and overcurrent relays. This also includes checking of metering and SCADA systems. Post in-service tests may also include online tests of substation equipment including insulating oil tests of power transformers and infrared-thermography testing.

Final Design/As-Built Documents

The Interconnection Party must at the time of demonstration testing have a complete set of construction drawings and documentation available. These documents should represent a complete set of information showing exactly how the facility has been built and the logic behind how the control systems will operate.

The documents shall include but are not limited to one-line diagrams, meter and relaying diagrams (M&R), AC and DC elementary diagrams (schematic drawings), circuit lists,

Programmable Logic Controller (PLC) and relay logic, and any other appropriate or necessary information. Platte River should be provided a duplicate copy of this documentation at least two weeks prior to demonstration testing. A coordination meeting with Platte River should be held to clarify any questions on documentation or testing requirements before demonstration testing begins.

Operation and Maintenance Guidelines

General guidelines will be stated below, but any specific guidelines will be defined in the Interconnection Agreement between the Platte River operating companies and the Interconnection Party.

The Interconnection Party shall operate within the applicable guidelines of this document and any other specific requirements as stated in the Interconnect Agreement, and the Transmission Service Agreement, if applicable.

Normal Conditions

The Interconnection Party must operate according to the instructions and approval given by the Platte River Transmission Control Center personnel. The Interconnection Party shall have twenty-four hour support available.

Abnormal Conditions

Platte River reserves the right to open the interconnection for any of the following reasons:

1. Line maintenance work on Platte River's System.
2. Substation maintenance on Platte River's System.
3. Platte River System emergency.
4. Inspection of an Interconnection Party's substation equipment and protective equipment reveals a hazardous condition.
5. Failure of the Interconnection Party to provide maintenance and testing reports when required.
6. Interconnection Party's transmission facilities interfere with other Platte River customers, other Interconnection Parties, or with the operation of Platte River's System.
7. Interconnection Party has modified the transmission facilities that affect Platte River equipment without the knowledge and approval of Platte River or has not installed protective devices required by Platte River.
8. Personnel or public safety are threatened.
9. Interconnection Party fails to comply with applicable Platte River switching procedures.
10. To address abnormal frequency or voltage conditions or power quality conditions determined by Platte River to adversely impact the Platte River system.

Changes to the Platte River System or the addition of other Interconnection Party's facilities, loads, or generators in the vicinity may require modifications to the interconnection protective devices. If such changes are required, the Interconnection Party may be subject to future charges for these modifications.

Energization of Platte River Equipment by the Interconnection Party

The Interconnection Party must not energize a de-energized Platte River circuit (unless specifically authorized and requested by Platte River).

Maintenance Notification

The Interconnection Party must notify Platte River of any unusual conditions including, but not limited to the following:

1. Partial operating capability due to equipment limitations.
2. Scheduled outage periods and return to service expectations. Return to service notification must be updated daily to reflect the recent progress or the lack of progress.

Maintenance

Interconnection protective devices owned by the Interconnection Party should be maintained and inspected according to manufacturer recommendations, NERC, and/or industry standards. Notification of scheduled maintenance requiring system outages must comply with Platte River and Regional notification requirements. Procedures must be established for visual and operational inspections. Provisions should be established for equipment maintenance and testing. Equipment should include, but not be limited to:

1. Power Transformers
2. Circuit Breakers
3. Protective Relays
4. Station Batteries
5. Current and Voltage Sensing Devices
6. Hand Operated Disconnects
7. Circuit Switchers
8. Capacitor Banks
9. Reactors

Platte River maintains the right to review the maintenance, calibration, and operation data of all protective equipment for protecting Platte River facilities, customers, and other producers. The Interconnection Party is responsible for providing the necessary test accessories (such as relay test plugs, instruction manuals, wiring diagrams, etc.) required to test these protective devices. Verification testing may include the tripping of the intertie breaker. If Platte River performs work on the premises of the Interconnection Party, Platte River operating personnel may make an inspection of the work area. If hazardous working conditions are detected, the Interconnection Party must correct the unsafe conditions before Platte River personnel will perform their work.

Design Changes after Commercial Operation

Any modifications to the Interconnection Party requiring Platte River protective relaying and interlocks after the date of commercial operation must be reviewed and approved by Platte River prior to implementing any changes. Demonstration of Relay Calibration, Trip Tests, and On-Line Tests may be required depending on the extent of the design change. Setting changes of any interconnection protection or synchronizing device must be approved by Platte River with a hard copy of the changes forwarded to the designated Platte River representative. Any "Field Modification" or "As Built" AC/DC protection and synchronizing schematics associated with any Platte River required interconnection device must be forwarded to the designated Platte River representative.

Operating Data Submittals

The Interconnection Party must provide operating data and equipment modeling to Platte River and/or the appropriate regional reliability organization to support the following:

1. NERC compliance program(s).
2. Regional Reliability Organization compliance program(s).
3. Federal, state and local regulatory programs.

Operational Log

Interconnection Party must maintain an operating log at each interconnection facility indicating changes in operating status, maintenance outages, trip indications, or other unusual conditions found upon inspection.

Communication with Platte River Operations

The Platte River representative will provide the Interconnection Party with the names and telephone numbers of the Platte River Control Center and Operations Coordination personnel responsible for Platte River System at the interconnection. The Interconnection Party will provide

Platte River with the names and telephone numbers of the personnel with responsibility for operating the interconnection Facilities.

The contact(s) of the Interconnection Party should include at least one 24/7-telephone number. Contacts should be able to provide information on equipment status, explanation of events on the Interconnection Party's transmission facilities, and relay target and alarm information when asked to do so by Platte River personnel. In addition, the Interconnection Party should contact Platte River whenever:

1. Problems with the Interconnection are detected that could result in mis-operation of interconnection protection or other interconnection equipment.
2. The Interconnection has opened by protective relay action.
3. Interconnection transmission facility's problems result in an outage to a portion of the Platte River System.
4. The Interconnection Party intends to initiate switching to parallel the Interconnection Party(s) and the Platte River System.
5. The Interconnection Party intends to initiate switching to break the parallel interconnection between Interconnection Party(s) and the Platte River System.

Reviewed and approved by:



Mark Curtis, System Engineering Manager

02/16/12

Date

Version History

Version	Date	Action	Owner	Change Tracking
0.0	06/17/07	New Document	Mark Curtis	New
1.0	08/27/07	Added Data Requirements	Mark Curtis	Revision
1.0	08/27/08	Annual Review	Mark Curtis	Review
2.0	01/06/09	Clarified inspection and equipment requirements. New template	Mark Curtis	Revision
3.0	01/06/10	Errata	Mark Curtis	Revision
3.0	01/06/11	None	Mark Curtis	Review
4.0	02/06/12	Major Revision	Mark Curtis	Revision
4.0	01/22/13	Errata	Mark Curtis	Revision
4.0	03/05/14	Errata	Mark Curtis	Revision
5.0	10/14/15	Errata	Mark Curtis	Revision
6.0	12/14/15	Added Procedures for Coordinated Studies & Notifications	Mark Curtis	Revision