EAST KENTUCKY POWER COOPERATIVE

Policies and Procedures Cover Sheet

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1.0 Introduction

East Kentucky Power Cooperative (EKPC) has developed this document to provide direction for those wishing to interconnect to the EKPC system in compliance with NERC Reliability Standard FAC-001. Facility connection and performance requirements are established to avoid adverse impacts on reliability of the Bulk Electric System. These requirements address the minimum requirements for Generation facilities, Transmission facilities, and End-User facilities (hereinafter referred to as Requesters) connecting to the EKPC Transmission System. Except in cases where specifically classified, the requirements in this document are applicable to connection of generation, transmission, and end-user facilities.

EKPC is a member of the PJM Interconnection LLC ("PJM"). PJM has primary responsibility for the generator interconnection process and its requirements. This document is intended to highlight the EKPC connection requirements and is not intended to fully replicate or to replace PJM's documentation.

The PJM Manual 14 series addresses the interconnection process, planning study requirements, and facility connection requirements specific to the PJM transmission system:

- Manual 14A introduces the overall process flow for generator and transmission interconnections in order to guide developers through the planning, facility construction, and implementation process described in detail in Manuals 14B, 14C, 14D, 14E, 14F, and 14G.

- Manual 14B describes the planning process for expansion and/or enhancement of the PJM transmission system. The requirements for executing necessary interconnection agreements to establish and implement the interconnection of generation and transmission facilities with the PJM transmission grid are also described in Manual 14B.

- Manual 14C describes the engineering and construction process to complete the interconnection of new facilities with the PJM transmission system. The standardized terms and conditions for completing interconnections and for operation and maintenance of interconnection facilities are included in Manual 14C.

- Manual 14D focuses on the generator markets and operations requirements for generating entities to connect to the PJM system and their responsibilities as signatories to the Operating Agreement of PJM.

- Manual 14E describes those additional procedures applicable to Merchant Transmission projects. Merchant Transmission developers must also work with PJM staff to meet the business and operating requirements of the PJM Operating Agreement, including metering requirements. Section 3 of the manual includes design, construction, and operational requirements.

- Manual 14F outlines the process to conduct competitive proposal windows consistent with FERC Order No. 1000.

- Manual 14G identifies interconnection requirements, upgrade requirements, study/agreement overview, and rights for any generator customer. It guides a Generation Interconnection customer through the application, study and agreement process, including specific requirements and rights as a generator participating in the PJM market.

As a PJM member, EKPC is an active participant in PJM's interconnection process. The PJM Manuals can be accessed via the PJM website at www.pjm.com. Requesters should review the PJM Manuals for specific PJM requirements.

In addition to the PJM Manuals, the PJM Open Access Transmission Tariff (OATT) includes additional information and requirements regarding connection of facilities to the PJM system. Connection to the EKPC transmission system will, where applicable, be covered by the requirements specified in the PJM OATT. The PJM OATT is also posted at www.pjm.com.

The PJM Regional Transmission Expansion Planning (RTEP) process is utilized for utility-to-utility reliability-based interconnections. Generator and Merchant Transmission interconnection requests are referred to PJM, and the PJM interconnection process. In PJM Manual 14A, the section on Specific Process Flow and Timeline provides a summary of the PJM Interconnection process. This manual states that "Entities requesting interconnection of a generating facility (including increases to the capacity of an existing generating unit or decommissioning of a generating unit) or requesting interconnection of a merchant transmission facility (including upgrades to existing merchant transmission facilities), or upgrades to existing transmission owner facilities within the PJM RTO

must do so within PJM's defined interconnection process." Impacts to the system are determined by a series of studies that comprise three phases.

The information contained in this document is not intended to capture each and every specific equipment and installation requirement. The minimal requirements specified in this document may need to be modified to meet the needs of unique installations. The intent of the requirements is to address all types of interconnections. As such, not all of the requirements will necessarily apply to all types of interconnections. EKPC reserves the right to determine which requirements apply to any specific requested interconnection. Specific requirements necessitated by the type of interconnection and the intended point of interconnection will be communicated to the Requester prior to the construction phase of the project.

All new connections, or modifications to existing connections, to the EKPC transmission system, including EKPC self-built facilities, must be in compliance with all applicable EKPC and PJM connection requirements. Such connections must also comply with all applicable Planning, Operations, and Critical Infrastructure Protection Reliability Standards of the Federal Energy Regulatory Commission's (FERC) approved Electric Reliability Organization (ERO), which is currently the North American Electric Reliability Corporation (NERC), and with all SERC Reliability Corporation (SERC) Guidelines to the NERC Reliability Standards.

This document will be reviewed annually to ensure best practices. Upon request, the most recent edition of EKPC's Facility Connection Requirements (The Requirements), will be made available within four business days.

The timeline associated with the submission of the requirements document is outside FAC-001 requirements. It is part of EKPC's operational best practices.

The latest version of the document is publicly available on the PJM website at the following location:

https://pjm.com/planning/design-engineering/to-tech-standards/ekpc

1.1 Background

The present electric utility environment is characterized by de-regulation, open access to the transmission network, wholesale and retail competition, etc. This

present era of rapid change places additional challenges on the planning and operation of electric systems to maintain reliability, safety, and quality of service.

Each request to connect to and use the EKPC Transmission System will be reviewed to identify the impacts and necessary system improvements on the EKPC system. These reviews ensure that comparable treatment is given to all users, and that reliability, safety, and quality of service are maintained.

1.2 Scope

These requirements inform entities seeking facility connections to the EKPC Transmission System of EKPC's connection requirements. These requirements are not a substitute for specific interconnection agreements between EKPC and/or PJM and entities connecting to the EKPC Transmission System.

The scope of these requirements satisfies the NERC Reliability Standards by identifying requirements for connections to the bulk transmission system at voltages generally 100 kV and above. These requirements may also generally apply to connections to those systems designated as transmission facilities that are rated at lower voltages, which include 69 kV. Requirements applicable for all types of Interconnection, End-User, and Generation facilities are covered. These requirements will be applied in a consistent manner to both EKPC-owned facilities and non-EKPC facilities wishing to interconnect to the EKPC transmission system.

The minimum requirements pertaining to connected facilities are contained herein. Reliability concerns in particular are such that additional facility and operational requirements may need to be imposed on connecting facilities based on their location within the system, facility power level, and the associated impacts on EKPC's system performance. The need for additional requirements can only be evaluated once certain details of a proposed facility are made known and system impact studies have been conducted. The requirements for initial facility connection apply equally to any upgrades, additions, enhancements, or changes of any kind to an existing connected facility.

In general, any new equipment or replacements of existing equipment that will be owned and maintained by EKPC will be standard equipment utilized on the EKPC system.

The scope of these requirements is limited to the technical requirements for connected facility design and operation. Requesters requiring transmission service are also referred to the PJM OATT located at www.pjm.com .

1.3 Objectives

EKPC has prepared this document based on the following objectives:

(a) Maintain system reliability, personnel and equipment safety, and quality of service as load, system modifications, and new facilities are added to the transmission network.
(b) Ensure comparability in the requirements imposed upon the various entities seeking to connect facilities to the transmission network.
(c) Satisfy compliance with NERC Reliability Standard FAC-001 and corresponding SERC Guideline documents pertaining to documentation of facility connection requirements by those entities responsible for system reliability.
(d) Inform those entities that seek facility connections to the EKPC Transmission System of the various requirements for system reliability, reporting requirements, (as specified by the NERC Reliability Standards and SERC Guideline documents), and other applicable standards and documents.
(e) Facilitate uniform and compatible equipment specification, design, engineering, and installation practices to promote safety and quality of service.

2.0 Written Summary of Plans to Achieve Required System Performance, Procedures for Coordinated Studies, and Notification of new or modified Facilities to Others

The impact of the interconnection request on the reliability of the interconnected transmission system shall be evaluated. Studies are performed by EKPC and/or PJM, and in accordance with established NERC, SERC, PJM, and EKPC transmission planning criteria.

Generation and Merchant Transmission Interconnection Requests
During the PJM-defined study phases for the interconnection of Generation and Merchant Transmission (as described in PJM Manual 14A), a series of studies is performed to determine the impact of the interconnection request on the system. The study results include identification of solutions to any identified reliability violations. The results of these studies are posted to the PJM website.

Transmission Interconnection – Transmission Owner to Transmission Owner

PJM performs annual studies to evaluate system reliability as described in PJM Manual 14B. As part of the evaluation process, it may be determined that there is a need for additional system reliability support across multiple interconnected transmission owner facilities. Solutions to identified reliability issues are developed by the affected transmission owners in coordination with PJM. The study results and resultant solutions identified are documented in the PJM annual RTEP results and posted to the PJM website.

End-User Interconnection Requests

End-user requests are evaluated by EKPC to determine if any system reliability impacts may result from the interconnection of the customer to the transmission system. Studies are primarily conducted to determine if there is available capacity at the interconnection point to accommodate the request. If the need for additional system reinforcements is identified during the study, the results will be made known to the Requester and solutions will be proposed to address the issue.

One of the many functions of PJM is to coordinate joint studies of new facilities and their impacts on the interconnected transmission system. As a member of PJM, EKPC actively participates in this study process. The process is described in the PJM Manual 14 series of documents, which are available on the PJM website (www.pjm.com).

PJM Manual 14A (Generator and Transmission Interconnection Process) includes attachments to the Manual that define the data requirements for interconnection Feasibility and System Impact Studies. Generators and Merchant Transmission interconnection customers should refer to the Manual for specifics.

Study results associated with individual generation and merchant transmission facility requests are posted by PJM to the PJM website.

For transmission interconnection requests, summary study results are published by PJM annually as part of the Regional Transmission Expansion Planning (RTEP) process. Interim results of studies are shared at periodic Transmission Expansion Advisory Committee (TEAC) and Subregional RTEP Committee meetings held by PJM in order to provide opportunity for stakeholder input. TEAC updates are publicly posted to the PJM website.

Interconnection planning studies are conducted to meet the criteria established within the NERC TPL series of Reliability Standards, PJM Manual 14B, and the EKPC transmission planning criteria. Copies of the applicable planning standards

are available on the NERC and PJM websites. The impact studies that will be considered include, but are not limited to, the following:

- Fault duty
- Stability
- Power flow
- Transfer capability

EKPC and/or PJM will request all necessary data from the Requester for any new interconnection requests and for notification of planned modifications and/or additions to existing facilities connected to the EKPC transmission system. This data will need to be supplied in order for the appropriate studies to be completed. Any delay in providing this data may prevent impact studies from being performed in a timely manner, which in turn may delay or prevent approval of the connection request or modifications of existing connections.

End-users desiring to connect to the EKPC transmission system should submit a request in writing to EKPC's Manager of Planning Engineering. Applicable study results regarding feasible interconnection alternatives and possible system impacts will be provided to the Requester.

EKPC approval of a proposed facility or facility change is contingent upon a design review of the proposed connected facility. Operation of a connected facility is also subject to continuing compliance with all applicable construction, maintenance, testing, protection, monitoring, and documentation requirements described herein, as well as the applicable NERC Reliability Standards, SERC Guideline documents, and, if applicable, PJM requirements.

Any additions or modifications to existing facilities that have the potential to affect an interconnection require the customer to notify EKPC's Manager of Planning Engineering as soon as feasible. This notification should also include the expected timeframe in which the planned modifications or additions would occur. EKPC will assess the potential impact of the modifications and contact the appropriate affected parties. The significance of any impact has the potential to vary over a broad range. Changes that could affect the operating limits on the interconnected system may require engineering studies and the involvement of PJM in the study process. Changes that modify power output for a generating facility must follow the requirements of PJM Manual 14A.

3.0 Voltage Level and MW and MVAR Demand

The Requester will specify the voltage level at which it intends to interconnect to the EKPC transmission system. Nominal transmission system voltages presently on the EKPC system are 345kV, 161kV, 138kV, and 69kV. The Requester connecting to EKPC's Transmission System should expect voltage levels which generally during system normal conditions and single transmission-element outage conditions range between 92% and 105% of nominal voltage. All interconnected facilities are expected to operate in this range at all times. If the Requester's supply voltage requirements are more restrictive than the 92% to 105% range, EKPC recommends that the Requester consider the addition of voltage regulation equipment in its facility.

Under certain emergency conditions, the EKPC Transmission System may operate for a period of time outside of the 92% to 105% range of nominal voltage. The Requester is responsible for providing any voltage sensing equipment required to protect its equipment during abnormal voltage operation.

Electrical system design of the interconnected facility (e.g., transformers, tap settings, motors and other loads, generator/exciter, voltage regulator) should not restrict any mode of operation within the EKPC transmission system's allowable voltage range and regulation. The design should support continuous reactive capability requirements at the point of connection to the transmission system.

Transmission interconnected equipment should have the tap ranges and self-regulation necessary to operate within EKPC's transmission system voltage range and to accommodate the transmission system's reactive power flow requirements. Factors to be evaluated associated with connections to the transmission system include:

- Load power factor
- Generator power factor
- Load equivalent sources of reactive power
- Generator equivalent sources of reactive power

The impacts of a new facility connection to the EKPC system with regard to neighboring utilities' voltage and/or reactive compensation devices will be assessed. The Requester will be responsible for the cost of mitigating any adverse impacts on the neighboring system.

For an End-Use Facility, the Requester will supply a minimum of 10-year demand projections (both MW and MVARs) to be updated at least once every two years. For a transmission or generation interconnection, the Requester will provide all necessary information needed for EKPC and/or PJM to conduct a System Impact Study to adequately assess the voltage levels and MW/MVAR flows expected if the Transmission or Generation Interconnection is implemented. This information typically will involve detailed modeling data for the transmission network and/or generation facility that will be connected to the EKPC system sufficient for power flow, short-circuit, and other engineering analyses.

An end-use facility connected to the EKPC transmission system may be incorporated into EKPC's load-shed plans to ensure the reliability of the EKPC system and/or the Bulk Electric System. EKPC will consider the need for facilities to be included in the load-shed plan on a non-discriminatory basis – i.e., based on technical and operational requirements without consideration of ownership of a facility.

The Owner of a generating facility connected to the EKPC transmission system will be required to provide the net demonstrated real and reactive power capability of each generating unit to EKPC and PJM, as required by SERC. The NERC Reliability Standard MOD-025 provides additional information regarding the requirements for Generator Owners to be in compliance. All data accumulated from testing in compliance with the NERC and SERC requirements should be provided to EKPC and PJM in a timely manner. Other generator parameters must also be provided as required by EKPC and/or PJM.

Any generation facility connecting to the EKPC system will be required to follow PJM operational requirements. Some of the items that will be specified by PJM include, but are not limited to, the following:

- Load following capability
- Automatic Generation Control (AGC)
- Reactive power output (voltage schedule provided by EKPC and/or PJM)
- Minimum operating capability
- Remote control functions
- Coordination of generation control system settings
- Blackstart capability
- Mode of frequency control
- Operation of generators during frequency decline conditions

- Coordination between generator controls and underfrequency load shedding programs
- Speed droop settings
- Coordination of generating unit operations
- Verification of reactive support capability

Either PJM or EKPC may require a change in Generator step-up transformer (GSU) tap settings to meet voltage schedule and reactive support requirements.

Operation of any facility connected to the EKPC transmission system will be at 60 Hz nominal frequency.

A Power System Stabilizer (PSS) may be required to be installed for certain conditions as identified in the SERC Guideline document *SERC Power System Stabilizer Guideline*. This document recommends installation of a PSS on all synchronous generators with output greater than 100 MVA connected at 100 kV and above, or for units at plants with a total output greater than 300 MVA. Additionally, system studies or operating experience may identify the need for a PSS regardless of unit size.

Additionally, the SERC Guideline document recommends that existing generators be retrofitted with a PSS when the excitation system or voltage regulation system is replaced. These retrofitted stabilizers must be tuned and activated unless PJM and EKPC determines this is not necessary. If PJM and/or EKPC identifies a need for a PSS for an existing generating unit, the Generator Owner may be required to procure, install, tune, and activate a PSS.

The PSS is expected to be an accelerating power delta-P-omega type. Other types that are functionally equivalent may be accepted on a case-by-case basis.

The Generation Owner will be responsible for the analysis, procurement, installation, tuning, and testing of the exciter and stabilizer controls for optimum performance. The Generator Owner must ensure that all necessary studies and field tests are performed to determine the optimum PSS settings prior to commercial operation of the generating unit. PJM and/or EKPC shall perform (or contract to have performed on their behalf) other relevant studies and shall coordinate with the Generator Owner and the equipment vendor to establish reliable settings for the PSS. The PSS tuning test documentation – including the PSS dynamic model and final settings – shall be provided to PJM and EKPC for their review prior to the commencement of commercial operations for new

generating units. For existing generating units that are retrofitted with a PSS, the documentation shall be provided when the testing of the PSS is complete.

If future system conditions change significantly, PJM and/or EKPC may require the Generator Owner to reset the PSS parameters to more appropriate settings to preserve the overall reliability of the transmission system.

A PSS may be taken out of service for scheduled maintenance only with PJM's prior approval. The Generator Owner will be required to take the PSS out of service if PJM identifies transmission system operating conditions during which the operation of the PSS would adversely affect the stability of the transmission system or its connected generators. If a PSS is removed from service or is not capable of automatic operation, the Generator Owner shall immediately notify PJM. Operating limits may be applied in such cases based on system limitations identified by PJM.

4.0 Breaker Duty and Surge Protection

4.1 Interrupting Device / Breaker Duty

The Requester shall provide three-phase circuit-interrupting device(s) with appropriate protective relaying systems (as stated in Section 5 below). The device(s) shall isolate the facility from the EKPC electrical system for all faults, loss of EKPC supply, or abnormal operating conditions regardless of whether or not the facility is operating. All facilities and equipment should fully comply with the latest ANSI/IEEE C37 collection of standards for circuit breakers, switchgear, substations, and fuses.

This circuit-interrupting device shall be capable of interrupting the greater of the maximum available fault current at that location available from either the Transmission System or from the Facility as determined using fault analysis engineering programs. Full fault-interrupting capability is per the latest IEEE C37 and C57 collections of standards. EKPC will provide short-circuit data for existing and estimated future 3-phase fault and single line-to-ground fault amps. The Requester will be responsible for providing EKPC with all data necessary to determine the future fault-current levels. A required change of an interrupting device due to over-dutied short-circuit capabilities will be the financial responsibility of the entity causing the increased fault currents. EKPC considers an interrupting device to be over-dutied at or above 90% of its interrupting rating.

The three-phase device shall interrupt all three phases simultaneously and shall have maximum operation time of 2 cycles or less from time of energization of the trip coil(s). EKPC may accept 3-cycle interrupting devices depending on their location within the EKPC system. The tripping control of the circuit-interrupting device shall be powered independently of the Transmission System or Facility AC sources in order to permit operation upon loss of the Transmission System connection or the Facility AC supply. The protective trip signals to the interrupting device should be arranged into two independent trip circuits including separate relay trips, trip coils, separate DC control buses and two independent DC sources.

Generally, automatic reclosing of the facility's interrupting device is not desired. If the facility's configuration requires automatic reclosing, EKPC will provide the specific reclosing times for the Facility's interrupting devices.

Interrupting devices must be capable of operating within the normal steady-state voltage range of the EKPC transmission system (92% to 105% of nominal voltage), and should also be capable of operating outside of those ranges for transient conditions (i.e., fault conditions) and for short periods of time during emergency conditions (for example, during unplanned outages of one or more transmission-system elements). The interrupting devices should have adequate steady-state normal and emergency thermal ratings to transmit potential expected current levels for normal and single-contingency conditions at peak levels.

4.2 Surge Protection (Lightning Arresters)

Lightning-arrester allowable separation distance from the equipment being protected is based on Table 4 of IEEE Std. C62.22. Consult the manufacturer's catalog for details concerning arrester protective characteristics, ratings, and application. Location and ratings of lightning arresters will be addressed during the design phase of the project and shall meet the requirements as determined by lightning and switching surge analysis and the latest IEEE Std. C62.

5.0 System Protection and Coordination

5.1 General Requirements

Protective relaying systems and associated communication systems for all facility interconnections shall be planned, designed, constructed, and maintained in accordance with applicable NERC, SERC, and PJM standards and guidelines. The Requester is responsible, under all system operating conditions, for providing

adequate protection to its electrical facilities as well as the adjacent EKPC facilities and maintaining the safety of the general public. For a generating facility, the Requester is responsible for providing adequate protection to its generating facility under any EKPC transmission system operating condition, even if the interconnected generating facility is not in operation. All protective relays shall meet or exceed ANSI/IEEE Standards C37.90 and C57 for protective relaying systems and adhere to all NERC and PJM standards related to system protection.

EKPC and/or PJM will perform all appropriate studies for system protection and coordination relating to EKPC facilities in the area of the proposed interconnection as necessary, including (but not limited to) the following:

- Coordination of protective devices
- Short circuit analysis
- Circuit breaker duty rating analysis

EKPC will provide functional specifications for all protective relays at the Requester's facility that have a potential impact on the reliability of the EKPC transmission system or neighboring transmission systems. The criteria for these functional specifications will be based on existing EKPC protection standards. EKPC reserves the right to specify the type and manufacturer for these protective relays to ensure compatibility with existing relays. The specific recommendations and requirements for protection will be made by EKPC based on the individual substation location, connected voltage level and system configuration.

EKPC will review and approve all protective relay settings developed for equipment at the Requestor's facility. Relay settings shall adhere to EKPC protective relay settings guidelines and philosophies to ensure coordination with the existing EKPC or neighboring transmission system. EKPC reserves the right to require specific protective elements, settings, or schemes at the Requestor's facility, which may include additional equipment, to ensure adequate backup protection, reliability, and coordination.

EKPC will coordinate all system protection design and settings components regarding connected with neighboring systems as required and as prudent to ensure the reliability of the interconnected electric system.

A power source for tripping and control must be provided for the protection system by a DC storage battery. The battery is to be sized with enough capacity to operate all tripping devices for eight (8) hours without a charger, per IEEE standards. The battery sizing calculation shall be in accordance with IEEE Std. 485. An

undervoltage alarm must be provided, with monitoring by the facilities owner, who shall take immediate action to restore power to the protective equipment upon receipt of an alarm.

All new facilities, or upgrades to existing facilities, should use digital relays with fault-recording capabilities. All Requester digital relays used for protective devices connecting to EKPC transmission facilities shall have the capability of recording system-disturbance information. EKPC shall be allowed access to all relay settings documentation, including configuration files and records.

5.1.1 Existing Facility Protection Equipment

In many cases, the protection and associated equipment installed at existing EKPC transmission facilities will be legacy equipment that does not meet current standard protection philosophy. Legacy system protection equipment that is identified as part of an interconnection shall be upgraded to the latest standard equipment to ensure compatibility of protection schemes including communication aided schemes such as line current differential (87L) and permissive over-reaching transfer trip (POTT) schemes. This includes protection equipment at the local facility to be interconnected, as well as necessary equipment at adjacent transmission facilities.

5.1.2. Transformer Requirements

EKPC will model Requester's facility and confirm the transformer-winding configurations and any grounding requirements based on the specific Requester site location and generator type. Typical transformer connections are as follows:

For Requestor load facilities with no generation export onto the EKPC transmission system, the main transformer shall have a high side (EKPC interface) delta connected winding.

For Requestor synchronous generation facilities, generator step-up (GSU) transformer shall have high side (EKPC interface) grounded wye connected winding, low side (Requestor interface) delta connected winding.

For Requester inverter-based generation facilities, generator step-up (GSU) transformer shall have high side (EKPC interface) grounded wye connected winding, low side (Requestor interface) grounded wye connected winding, and a delta connected tertiary winding.

5.2 Protection Design Requirements

5.2.1 Distribution Facilities

Interconnecting load facilities may connect directly to an existing EKPC transmission line, see Figure 1 in Appendix A for typical arrangement. All interconnecting load facilities shall have adequate protection of the facility to ensure isolation of faults without relying on EKPC protection schemes for primary or backup protection functions. EKPC will review and approve Requestor distribution protection schemes to ensure proper coordination with the transmission line protection and verify adequate local protection of the Requestor facility.

EKPC will complete an impact study for transmission line protection system coordination to determine any issues created by the new tap or tap line. The study will include the transmission line with proposed Requestor interconnection as well as adjacent transmission lines from the remote terminals of the line. New tap lines on the main transmission line shall be protected by high-speed protection elements per current EKPC protection philosophies and will not be allowed to rely on sequential tripping to detect or clear faults. If EKPC determines that proper coordination or adequate protection cannot be achieved on the local transmission line or adjacent lines, including relying on sequential tripping, EKPC will require the implementation of a high-speed communications aided protection scheme for transmission line protection.

Requestor facilities located within five (5) miles of a transmission substation will be reviewed for coordination to determine if the station shall be supplied from a radial transmission line directly from the transmission substation. Load stations tapped within close proximity of transmission stations cause coordination issues for transmission line protection systems and reduced reliability of the EKPC system. Loads tapped directly from transmission stations shall follow all current EKPC protection standards as shown in Figures 2 & 3 in Appendix A.

If EKPC determines that Requestor protection system cannot provide adequate protection to the EKPC system or proper coordination with EKPC transmission line protection, the Requester shall furnish and install a direct transfer trip (DTT) scheme using Schweitzer Mirrored Bits protocol. The Requestor will be responsible for any necessary equipment or upgrades at EKPC facilities and the communication channel required for the transfer trip scheme.

All interconnecting load facilities will be required to utilize Motor Operated Air Break (MOAB) switches as indicated in Figure 1 in Appendix A. The purpose of the MOAB switches is to allow isolation and partial restoration through sectionalizing of the transmission line during permanent fault conditions. MOAB switches require telemetry as indicated in Section 6.2 for remote System Operator controls.

Interconnected load facilities that tap a transmission line >200kV are not currently allowed and will require a transmission switching station to be built as shown in Figure 3 in Appendix A.

5.2.2 Transmission Facilities

Requestor transmission facilities may interconnect the existing EKPC transmission system by connecting to an existing EKPC transmission substation as shown in Figure 4 in Appendix A. The arrangement is generally determined by the existing facility and includes main/transfer bus as well as breaker and a half bus configurations. Existing stations that do not meet current EKPC transmission standards will require upgrades to meet current bus configuration standards including but not limited to upgrading existing breaker bypass configurations and upgrading existing ring bus configurations. An interconnecting facility shall not use the last remaining line exit or breaker position available at an existing EKPC transmission substation. EKPC retains the last available exit at existing facilities for future transmission expansion.

It may be preferred for a Requestor transmission or generator interconnection to occur on an existing EKPC transmission line or EKPC distribution tap instead of at an existing transmission substation facility. New transmission lines with more than two terminals are explicitly prohibited on the EKPC transmission system due to reduced reliability and protection coordination issues that are created. Transmission or generator interconnections that create three terminal lines will require a new transmission facility as shown in Figure 2 & 3 in Appendix A. In the case a legacy three-terminal configuration exists and is proposed for the Requestor interconnection, the three terminal line configuration shall be eliminated by utilizing system configurations as shown in Figures 2 & 3 in Appendix A such that no three terminal lines remain connected to the Requestor facility. EKPC has the right to deny the Requester system configuration if the design fails the above-mentioned criteria. Additionally, if a Requestor submits a transmission or generator interconnection for a portion of the EKPC system that is configured and/or operated in a radial manner, the radial system will need to be modified to address system protection deficiencies, which typically will require one of the two following system modifications:

a. Construction of a new transmission switching station at the tap point for the radial line in order to have a dedicated circuit breaker protecting the radial line; or
b. Construction of a new transmission line from the radial tap point (or some other location on the EKPC transmission system that achieves a similar objective) to the new point-of-interconnection substation in order to provide two paths from the point of interconnection to the transmission system, thereby eliminating the single radial connection.

New transmission interconnecting facilities must be built in a fashion that does not create a ring bus configuration. EKPC does not allow new ring bus configurations and requires a minimum of (5) breakers for a new facility utilizing a breaker and a half bus configuration. All new main/transfer bus configurations will require transfer breakers to be installed per EKPC standard design to ensure proper transmission line protection and reliability during equipment maintenance. Typical EKPC bus arrangements per system voltage level are described in Figures 2 & 3 in appendix A.

EKPC will review the transmission interconnection and may require existing distribution facilities to tap directly from a new transmission facility bus, as described in Section 5.2.1.

All interconnected facilities greater than 100kV shall utilize redundant communication aided protection schemes on both Primary 1 and Primary 2 relaying schemes to ensure high speed fault clearing and proper coordination of all protective relays. Communication aided schemes on transmission lines greater than 200kV also require fully redundant communication channels without common points of failure to ensure the ability of the protection systems to operate properly if one of the primary communication paths is rendered unavailable. Redundant communication paths without common points of failure may be required by EKPC at any transmission voltage depending on location of interconnection.

EKPC will perform a coordination study of protective relay settings on local and adjacent transmission facilities to ensure proper coordination and fault clearing times can be maintained with the Requestor facility. Redundant communication aided protection schemes may be required for transmission lines less than 100kV based on results of a coordination study. For transmission lines that are less than 5 miles in length, redundant line current differential (87L) protection schemes will be required to ensure proper high speed clearing for the line, regardless of voltage level.

EKPC requires synchronism (SYNC) check protection on all transmission interconnections regardless of voltage level. Requestor will be responsible for installing SYNC check voltage transformer, sync check relays, and any other equipment at the interconnecting EKPC transmission facility per current EKPC protection system standards. Further requirements for synchronizing to the transmission system are described in Section 12.0

5.2.3 Generation Facilities

Typical Requestor generation facility interconnections are shown in Figures 2, 3, and 4 in Appendix A, depending on existing EKPC transmission facilities and interconnecting voltage level. All protection philosophy and standards described in Section 5.2.1 and 5.2.2 apply to transmission interconnections for generation facilities.

EKPC requires circuit breakers on the high-voltage side of transmission/step-down/step-up transformers where the Requesters facility can be a source to the EKPC transmission system. No other type of interrupting devices will be allowed as an alternative.

Inverter Based Resource (IBR) generating facilities will require redundant line current differential (87L) protection schemes with direct transfer trip (DTT) over fiber for the interconnecting transmission line between the EKPC facility and the Requestor facility. Transmission lines between any new EKPC transmission facility and the adjacent EKPC facilities, as shown in Figures 2 & 3 in Appendix A, shall utilize redundant communication aided protection schemes over fiber due to weak infeed conditions present when remote line(s) are out of service. EKPC will study the proposed IBR generator interconnection to determine the requirements of the communication aided protection schemes and proper backup protection schemes for the interconnecting and adjacent transmission lines. Line current differential (87L) is the preferred protection method for these configurations, however redundant Permissive Overreaching Transfer Trip (POTT) schemes may be approved by EKPC pending a comprehensive coordination review.

5.2.3.1 Parallel Generation Facility

The Requester shall provide redundant utility-grade protective relays at any generating facility to provide protection for the generating facility and the EKPC system. All relays specified for the protection of the EKPC system shall be approved by EKPC. Protective relays shall include the following functions at a minimum:

- Over/Under Frequency
- Over/Under Voltage
- Ground Fault Detection
- Reverse Power
- Synchronism Check
- Transfer Trip Receiver (As required by EKPC)

The purpose of these relays is to detect the Requester's energization of an EKPC circuit that has been disconnected from the EKPC system, to detect the generation operating at an abnormal voltage or frequency, or to detect a fault or abnormal condition on the EKPC system for which the Requester shall separate its generation. The Requester's generation facility shall never be operated in an electric island (i.e., facilities separated from the remainder of the interconnected system) that also includes EKPC facilities unless EKPC and PJM have directed such operation (for instance, during system restoration following a widespread outage). Appropriate protection devices must be installed and settings implemented on connected generation facilities to prevent such operation from occurring unless directed to operate in such manner by PJM and/or EKPC.

It is the Requester's responsibility to determine that its internal protective equipment coordinates with the required EKPC protective equipment and is adequate to meet all applicable standards to which the generation is subject. EKPC further reserves the right to modify relay settings for EKPC and/or Requester protective devices when deemed necessary to avoid safety hazards to utility personnel or the public and to prevent any disturbance, impairment, or interference with EKPC's ability to serve other customers.

At a minimum, the following items shall be coordinated between EKPC and connected generation facilities. NERC Technical Reference Document "Considerations for Power Plant and Transmission System protection Coordination" includes additional protective elements that should be considered to ensure reliability and coordination with the EKPC transmission system.

- Volts/Hz and over-excitation protection/limiting.
- Loss-of-excitation and under-excitation limiting.

Appropriate relays are necessary for connected generation facilities to synchronize to the transmission system. EKPC will review and approve the relays used and the settings prior to installation for connected generation facilities. Further

requirements for synchronizing generation facilities to the transmission system are described in Section 12.0.

5.2.3.2 Static Inverter

A Generating Facility comprising static inverters shall utilize inverters that have been tested and certified to UL 1741 with Advanced Inverter functionality (UL 1741 SA or subsequent UL equivalent), by a NRTL certified by OSHA to perform the UL 1741 SA test standard. The programming/set-points to be determined per EKPC recommendations and proof of implementaton of such shall be provided by Requester (i.e. certified test report, inverter settings print-out, and/or EKPC inspection/validation). Unity power factor shall be the default mode unless otherwise determined by mutual consent between EKPC and the Requester.

Inverter-based generation resources connected to the EKPC transmission system shall be able to withstand certain temporary excursions in voltage, frequency, reactive and real power output without tripping or entering momentary cessations, and meet the requirements and guidelines of IEEE Std. 2800. Generation must ride through temporary excursions to support the grid and avoid cascading events. At a minimum, the following grid support features are required unless otherwise specified by EKPC:

- Anti-Islanding – Support anti-islanding to trip off under extended anomalous conditions
- Volt/Var Mode – Voltage/Var control through dynamic reactive-power injection via autonomous responses to local voltage measurement
- Volt/Watt Mode – Voltage/Watt control through dynamic reactive-power injection via autonomous responses to local voltage measurement
- Fixed Power-Factor Mode – Reactive power by fixed power factor
- Constant Reactive-Power Mode – Reactive power by a fixed percentage of kVA rating of the inverter nameplate
- Frequency/Watt Mode – Frequency/Watt control to counteract frequency excursions beyond normal limits by decreasing or increasing real power
- Low/High Voltage Ride-Through (LHVRT) – Ride-through of low/high voltage excursions beyond normal limits
- Low/High Frequency Ride-Through (LHFRT) - Ride-through of low/high frequency excursions beyond normal limits
- Ramping – Capability to define active and reactive power ramp rates
- Soft-Start Reconnection – Reconnect after grid power is restored
- Cease to Energize – Capability to remotely turn off active power delivery

- Power Curtailment – Capability to remotely curtail the active-power production within the range of 0% to 100%

A redundant over/under-voltage relay will be required for static inverters with an AC output nominal rating of ≥1000 kW, or whenever the aggregate inverter AC output nominal rating of a Generating Facility is ≥1000 kW. For installations ≥10 MW redundant over/under-voltage and over/under-frequency protection will be required. Such protection shall be applied to one or more breakers external to the inverter(s).

Requester shall ensure, at a minimum, that the inverter performance tests specified below are performed and certified by a NRTL to ensure compliance with the following sections of IEEE1547-2018:

Section 7.0 Power Quality

a. *Section 7.1 Limitation of DC Injection*
b. *Section 7.2 Limitation of Voltage Fluctuations induced by the DER*
c. *Section 7.3 Limitation of Current Distortion*
d. *Section 7.4 Limitation of Overvoltage Contribution*

Requester shall provide EKPC with a copy of the test results and certification from the NRTL for EKPC review and approval.

5.3 Requester Owned Protection

The Facility Owner (generator, transmission, end-user) is responsible for providing a protection system that will protect its equipment against disturbances on EKPC's system and will prevent or minimize the effects of disturbances from its facilities on EKPC's equipment and transmission system. The protection system must meet the following design principles in order to achieve transmission system reliability:

- Dependability to detect all faults and abnormal conditions
- Selectively operate for faults and failure within its zone of protection
- Proper coordination between protection zones meeting minimum required coordination time interval (CTI).
- Operates quickly to isolate faulted elements

It is the Requester's responsibility to assure protection, coordination and equipment adequacy within its facility for conditions including, but not limited to:

- Single-phasing of supply

- System faults
- Equipment failures
- Deviations from nominal voltage or frequency
- Lightning and switching surges
- Harmonic voltages
- Negative sequence voltages
- Separation from EKPC supply
- Synchronizing of generation
- Synchronism checking of manual and automatic reclosing of transmission interconnections
- Islanding

The protection systems should prevent or minimize equipment damage as well as minimize system voltage disturbances, outage area, and equipment outage times.

The protection system should be capable of adequately providing coverage of the appropriate facilities for abnormal system conditions.

Output contacts of these relays shall directly energize the trip coils of the generator breaker or an intermediate auxiliary tripping relay, which directly energizes the breaker trip coils. The relaying system shall have a source of power independent from the AC system or immune to AC system loss or disturbances to assure proper operation of the protection scheme during loss of the AC source. Loss of this source shall cause removal of the generation from the EKPC system. The protective relays required by EKPC and any associated auxiliary tripping relays shall be utility-grade devices.

Utility grade relays are defined as follows:

- Meet ANSI/IEEE Standard C37.90, “Relays and Relay Systems Associated with Electric Power Apparatus.”
- Have relay test facilities to allow testing without unwiring or dis-assembling the relay.
- Have appropriate test plugs/switches for testing the operation of the relay.
- Have targets to indicate relay operation.

A grounding switch installation designed to place faults on the system and isolate a fault in the transmission/step-down transformer is prohibited on the EKPC system. Ground switches cause objectionable voltage sags and momentary

interruptions to the other EKPC End-Users and unnecessary stresses to the power system.

The use of a transfer-trip system to initiate tripping of a remote breaker(s) to isolate an End-User's transformer will not be considered as the primary protection scheme, but may be considered as a back-up system to the End-User's high-voltage side circuit switcher or breaker. Transfer-trip systems must include a local isolating motor-operated air break switch to permit remote-terminal circuit breakers to reclose and return the transmission line to service. Transfer-trip systems will only be considered where continuity of service of the line is not critical.

5.4 Engineering Documentation and Equipment Data

The Requestor shall supply comprehensive single line diagrams that include information regarding relaying, metering, and equipment to be installed at the Requestor Facility and any other information as requested by EKPC. Documentation shall be supplied with sufficient time for review and prior to any major relay or equipment purchases. Equipment on the single line diagram shall include major components including, but not limited to transformers, interrupting devices, switches, and instrument transformers.

The purpose of the documentation to be provided to EKPC by the Requester is to ensure proper coordination to protect against equipment or facility damage, to mitigate safety hazards to utility personnel and the public, and to minimize disturbances, impairment, or interference with EKPC's ability to serve other transmission-system users, by properly modeling and verifying equipment in the EKPC short-circuit model.

5.4.1 Equipment Documentation (Provided prior to final interconnection approval)

- **Synchronous or Induction Generator**
  - Complete nameplate and test report data
  - Harmonic content at full-rated output
  - Dynamic performance data
  - Real/reactive power capabilities at scheduled voltages.

- **Static Inverter**
  - Complete nameplate and test report data
  - Fault ride through capability
  - Dynamic performance data
  - Real/reactive power capabilities

- Short circuit modeling information including positive, negative, and zero sequence impedances.

- **Power Transformers**
  - Complete nameplate and test report data, including manufacturer, serial number, high side and low side voltage taps, MVA ratings, impedance, load loss and no-load loss watts, high side and low side voltage winding connections, and high voltage inrush current.
  - Complete equipment drawings and manual

- **Interrupting Devices**
  - Complete nameplate data including device ratings and instrument transformer ratings
  - Complete equipment drawings and manual

- **Power Capacitors**
  - Location
  - Complete nameplate data including voltage rating and KVAR rating of capacitor units
  - Capacitor Bank drawings or documentation including number of units, number of groups, and bank configuration details.

5.4.2 Protection Design Documentation (Provided at least six (6) months prior to in-service operation)

- **Protective Devices**
  - Complete manufacturer data for protective relays or fuses used for the protection of the EKPC system and/or the interconnected facility.

- **Drawings**
  - Single Line
  - Three Line
  - AC schematics
  - DC schematics including trip circuits and protection communications.

- **Relay Settings**
  - Relay settings calculations
  - Relay configuration files

5.4.3 As-Built Documentation (Provided within three (3) months after in-service operation)

- **Final Clean As-Built Drawings**
  - Single Line
  - Three Line
  - AC schematics
  - DC schematics including trip circuits and protection communications.

- **As-Left Relay Settings**
  - Final settings calculations and configuration files retrieved after relay testing and in-service commissioning

- **Commissioning & Test Reports**
  - Relay test reports
  - Inverter control commission/test reports
  - AC & DC circuit testing documentation

- **In-Service Verification**
  - Relay load verification
  - Meter commands
  - Triggered relay and device events

If the documentation is not available on the timeline indicated in Sections 5.4.1, 5.4.2, and 5.4.3, the Requester shall provide estimates based on its design information at that point in time. Such data shall be identified as "estimated" and replaced with actual data by the Requester as soon as it becomes available. Any delay in receiving actual data could affect equipment energization.

Upon energization of the Requestor facility, notification of major/minor alarms received, and protective relay targets upon operation of interrupting devices at the interconnection facility should be reported by the Requester to EKPC system operator as soon as identified.

5.5 NERC Reliability Standards Compliance

Requester shall develop design provisions to comply with applicable and current NERC reliability standards that have corresponding compliance responsibilities imposed on EKPC as a Transmission Owner (TO). If EKPC is required to have data that originates from Requester-owned equipment, the Requestor must enable EKPC to obtain the required data in a manner compliant with the respective standard. This applies for all current and future NERC Reliability Standards.

5.5.1 Automatic Under-frequency Load Shedding

EKPC may require automatic under-frequency load-shedding relaying on connected loads to comply with applicable NERC Reliability Standards, the SERC UFLS Standard, and applicable PJM manuals.

EKPC, as a SERC member, is obligated to have an automatic under-frequency load-shedding plan in effect that meets the SERC UFLS Standard. Connecting parties without an automatic under-frequency load-shedding plan meeting the SERC UFLS Standard may need to install under-frequency relaying at the request of EKPC. The amount of load to be shed and the frequency set-points will be coordinated and specified by EKPC as required to meet SERC under-frequency load-shedding compliance. For loads connecting to the EKPC system, total load shed contribution could be around 30% of maximum expected load in order for EKPC to comply with SERC under-frequency load shed requirements. Any new loads must coordinate a plan with EKPC for which portions of their load will be armed with under-frequency load shed, in accordance with their business practices and customer equipment.

5.5.2 Automatic Under-voltage Load Shedding

EKPC may require automatic under-voltage load-shedding relaying on connected loads if it is determined that such a scheme is necessary to maintain system reliability. EKPC will coordinate with the Requester regarding the types of relays required, location, and trip set-points if an under-voltage load-shedding scheme is necessary. EKPC may require automatic under-voltage load-shedding relaying on connected loads to comply with applicable NERC Reliability Standards and applicable PJM manuals.

5.5.3 Remedial Action Schemes

New Remedial Action Schemes (RAS) installations are not allowed by EKPC or PJM.

5.5.4 Digital Fault Recorder and Dynamic Disturbance Monitoring

EKPC may require the installation of digital disturbance monitoring equipment (DME) at new or upgraded interconnection facilities. DME(s) will be required for any computational load facility. DME(s) will also be required for IBRs and generators connecting to EKPC in compliance with NERC and PJM requirements. DME(s) will also be required for IBRs and generators connecting to EKPC in

compliance with NERC and PJM requirements DME data is used to provide high quality SER and triggered or continuous oscillography recordings for event analysis. All DME installed shall comply with applicable NERC Reliability Standards and applicable PJM manuals.

6.0 Revenue Metering and Telemetry Requirements

6.1 Revenue Metering

EKPC-approved revenue-class metering equipment installed at the interconnection point with the EKPC system is required in order to accurately meter the aggregated power delivered to and/or received from the interconnected facility. EKPC will own and maintain the primary metering used for measurement of flows across the interconnection point. The metering installation shall consist of instantaneous bi-directional real and reactive power and integrated hourly real and reactive energy metering. Variations to equipment installation and configuration diverging from those specified within this section are subject to EKPC review and approval. Interconnection facility configurations found in Appendix A indicate the typical point of interconnection metering locations.

The metering equipment shall include potential and current transformers, meters, and test switches. The accuracy class of the instrument transformers shall be 0.3 percent or better for voltage. For current, the instrument transformers should be high-accuracy extended-range class 0.15B1.8 from 0.05% through 200% of nominal current. Interconnection facilities that utilize AC power from the EKPC transmission system for station service will require standalone metering CTs. Breaker or power transformer bushing CTs (BCTs) will not be allowed for this configuration. Equipment BCTs may be allowed for some facility arrangements but must be reviewed and approved by EKPC. The secondary wiring and burdens of the instrument transformers will be configured so that they do not degrade the total accuracy by more than 0.3 percent. The metering equipment should meet or exceed accuracy class 0.2 and will be tested periodically as defined in the service agreement and the test results will be available to all involved parties. The meters, test switches, and wiring termination equipment will be sealed and the seal may be broken only when the meters are to be tested, adjusted, or repaired. Proper authorities from both parties will be notified when seals are broken. Metering of power and energy values is necessary at all times for both billing purposes and for the reliability of the transmission system. Therefore, the metering package should be designed to allow maintenance activities without losing the capability to continue to measure power and energy. In addition, the revenue meter shall meet ANSI C12.1 and C12.10 standards, and IEEE Std. C57.13.

EKPC will coordinate with the Requester regarding appropriate data protocols for metering purposes. The Requester will provide EKPC with the mode of data transmission. EKPC has the right to require different and/or additional data-transmission modes.

Three metering elements, one for each phase, will be used to measure all real and reactive power crossing the metering point. Bi-directional energy flows (import and export), including watt-hour and var-hour, will be separately measured at each point of the interconnection on an hourly basis. Appropriate demand quantities will be metered in terms of kilowatts, kilovars and/or kilovolt-amperes. EKPC and/or PJM may also require voltage measurements at the connection point to the EKPC transmission system.

Revenue-metering instrument transformers installed on either the high-side or low-side of the Requester's step-down/step-up transformer are permissible. However, the loss compensation for the transformer must be approved by EKPC before low-side metering will be allowed. The Requester must demonstrate that loss compensation can be accurately programmed into the revenue metering before it can seek written approval from EKPC for this configuration.

For interconnection of generation facilities to the EKPC system, the Requester should install its own metering equipment as a secondary meter for backup and data comparison purposes. The metering equipment should meet the requirements described above.

6.2 Telemetry

Suitable telemetry equipment will be installed at the metering point to provide real-time telemetry data to EKPC and to all other participating parties, including PJM. This data will be telemetered to a location designated by PJM and to a location designated by EKPC. An interconnecting customer that will be a PJM market participant shall install metering that is of sufficient quality to meet the requirements defined by PJM in the PJM Manuals 14A, 14C, 14D, and 14G, and 01 – Control Center and Data Exchange Requirements. Additional requirements may be applicable on a case-by-case basis.

Telemetry equipment will include transducers, remote-terminal units, modems, telecommunication lines, and any other equipment of the same or better function. The remote-terminal unit, or equivalent device, must have multiple communication ports to allow simultaneous communications with all participating parties. That

device will accommodate data-communication requirements specified by each participating party's control center, including communication protocol, rate and mode (either synchronous or asynchronous). All metered values provided to the telemetry equipment will originate from common metering equipment. All transducers used for telemetry will have at least 0.2 percent accuracy. As part of real-time data to be provided, EKPC has the right to require the status and remote control of switching devices (breakers, disconnect switches, circuit switchers, etc.) at the connected facility.

A continuous, accumulating record of Megawatt-hours and Megavar-hours will be provided by means of the registers on the meter. Freezing accumulation data for transmission will be taken every clock hour. The freezing signals must be provided by only one agreed-upon party. If the freeze signal is not received within a predefined time window, the remote-terminal unit, or equivalent device, will be capable of freezing data with its own internal clock.

The metering (if external power supply is required) and telemetry equipment will be powered from a reliable power source, such as a station control battery, in order to allow the equipment to be continuously operational under any abnormal power-supply situations. Proper surge protection will be provided for each communication link to protect communication hardware from ground-potential rise due to any fault conditions. A separate communication medium shall be provided to allow EKPC to remotely retrieve billing quantities from the meters. When real-time telemetry is required, a back-up data link must be provided in case of the outage of the primary telemetry line. The back-up link can be a data communication link between involved control centers; the party requesting connection to the EKPC system is responsible for furnishing the back-up link.

Telemetry of critical system values is necessary to ensure operational awareness and the reliability of the transmission system. Therefore, the telemetry equipment should be designed to allow maintenance activities without losing the capability to continue to measure and transmit system values, such as power flows, voltage, switching-device status, etc. The real-time data requirements defined in the PJM Manual 01 – Control Center and Data Exchange Requirements and PJM Manual 03 – Transmission Operations, shall be provided to PJM to fulfill its roles as Reliability Coordinator (RC), Balancing Authority (BA), and Transmission Operator (TOP).

Replacement or addition of EKPC protection or metering equipment at existing facilities will also require telemetry equipment upgrade or replacement to ensure compatibility and reliability of telemetry data.

EKPC will coordinate with the Requester regarding appropriate communication protocols for telemetry. The Requester will provide EKPC with the mode of data transmission. EKPC has the right to request different and/or additional data transmission modes.

At the discretion of EKPC, addition of generation control facilities/equipment and supervisory control and data acquisition (SCADA) of specific electrical devices either from or to the EKPC Control Center may be necessary to integrate a generation facility into the EKPC system/PJM Balancing Authority area. Such additional facilities, including required communication channels, shall, if required, be furnished and installed by the Requester. The requirement for data-acquisition and control will depend on the generation capacity, system location and voltage, and the net generation injection into the EKPC System.

Data-acquisition and control information will typically include, but not be limited to:

(a) desired generation MW-set point
(b) automatic generation control (AGC) status (on/off)
(c) AVR control status (on/off)
(d) generator availability
(e) gross generation MW and MVAR output
(f) Auxiliary MW, MVAR data for generator
(g) generator minimum and base MW capability
(h) generator MW AGC high limit and low limit
(i) connection facilities' breaker/interrupting device status/control/alarms
(j) connection facilities' MW and MVAR line values and bus voltage
(k) generator and substation energy metering (MWh and MVARh) data
(l) demand data – kW, kVAR (leading and lagging)
(m) Energy usage data – kW-hour, kVAR-hour

7.0 Grounding and Safety

7.1 Ground System Resistance

The grounding system should be designed in accordance with IEEE Standard 80 - latest revision, "IEEE Guide for Safety in AC Substation Grounding."

Ground-fault levels from EKPC sources will be provided as needed for Requester's ground-grid analysis. Requester equipment ground sources can contribute

significant fault current independent of the ground-fault values on EKPC's System. These Requester ground sources should be considered in the design of the grounding system. EKPC will review the grounding study performed by the Requester or a third party on behalf of the Requester. EKPC may choose to perform its own grounding study to evaluate the impact on grounding of EKPC facilities. EKPC will consider the compatibility of the grounding system with EKPC's existing system. EKPC shall approve the design of the grounding system with regard to any impacts on EKPC Facilities and any potential safety impacts on EKPC personnel that may have a need to enter Requester facilities.

EKPC and the Requester will coordinate regarding the need and/or desirability of connecting the grounding system of the connecting Facility to existing EKPC grounding system(s).

7.2 Electrical Safety Clearances (Outdoor)

Electric facility design clearances are listed in the table in Appendix B. These design clearances should be used for electrical facilities up to and including any interrupting device connected directly to an EKPC transmission line and for all facilities that are part of the EKPC transmission system.

The minimum vertical clearance of the conductors above ground level and the vertical and horizontal clearance of conductors passing by but not attached to a building or wall shall be constructed, maintained and operated in accordance with the NESC, Rural Utilities Service, and other applicable state and local codes.

7.3 Facility Fence Safety Clearances

The fence safety clearances in the Requester's facility shall comply with NESC/IEEE C2 Part 1 Section 11.

7.4 Other Considerations

If the Requester connects a transmission tap line to an EKPC transmission line without an automatic interrupting device (e.g., a circuit breaker) between the two lines, the Requester is required to have at least a single overhead ground wire on its transmission tap line to reduce the likelihood of lightning-related operations on the EKPC transmission line. EKPC will also have the right to review and approve the design of the transmission tap line to ensure proper grounding, lightning protection, and cathodic protection (if appropriate) to prevent undesirable operations of the EKPC transmission line.

Maintenance requirements for connected facilities are covered below in Section 13 of this document. These requirements also apply to the grounding of connected facilities and associated equipment (ground wires, fencing, overhead static wires, etc.).

Inspection requirements for connected facilities are covered below in Section 15 of this document. These requirements apply to the grounding of connected facilities and associated equipment. EKPC shall have the right to refuse connection to the EKPC transmission system if any potential safety issues are identified that could endanger the public or EKPC personnel until such safety issues are resolved to the satisfaction of EKPC. EKPC shall review and approve construction plans and techniques for any facilities that shall be directly connected to the EKPC transmission system.

EKPC will require the purchase and transference of all property rights, including ingress and egress to the site, of said property for any substation facilities built for ownership by EKPC. Standard substation facility property sizes are listed in the table below.

Substation Voltage	Acreage
69 kV	2
138/161 kV	7.5
345 kV	10.5

EKPC will require easements to be acquired and transferred for any line facilities to be constructed for ownership by EKPC.

8.0 Insulation and Insulation Coordination

8.1 Insulators for Substations

Required station post-insulator types are listed in Appendix B. Facilities in areas with significant airborne pollution may require a higher insulation level. Higher strength insulators are available and should be used if needed to meet bus momentary short circuit withstand values. Other requirements may be necessary

due to atmospheric, geological, seismic, or environmental conditions and will be discussed during the design phase of the project.

8.2 Equipment Basic Insulation Levels

The minimum Basic Insulation Levels (BIL) for equipment are listed in Appendix B. Facilities in areas with significant airborne pollution or other type of contamination may require a higher insulation level. Equipment BIL shielding and surge protection shall be designed to meet the latest IEEE C62 standards.

EKPC shall review and approve the design and specification of the insulation for any facilities being directly connected to the EKPC system that may impact the integrity of EKPC equipment or the reliability of the EKPC transmission system.

8.3 Other Design Considerations

EKPC will provide a Requester with its general design parameters and practices for various aspects of electrical insulation as appropriate, including shielding, attachment details, surge protection, current-carrying elements, etc. EKPC shall review and approve any insulation-related items that directly or indirectly impact EKPC facilities.

9.0 Voltage, Reactive Power, and Power Factor

PJM is responsible for ensuring the stability and reliability of the transmission system under its control. All interconnected generating facilities within the PJM footprint are responsible for operating their units in a stable manner while those units are connected to the EKPC transmission system. Generator-excitation and prime-mover controls are key elements in ensuring electric-system stability and reliability. To meet its responsibility, PJM must have the ability to establish voltage and governor-control requirements for all generators connected to the member PJM systems. These requirements may vary depending on the location, size, and type of generation installed.

The NERC Reliability Standards state that distribution entities and customers connected directly to the transmission systems should plan and design their systems to operate at close to unity power factor to minimize the reactive power burden on the transmission systems. The EKPC interpretation of “close to unity power factor” is that the power factor of the connected load should be within the range of 0.95 lagging to 0.98 leading. As allowed under applicable tariffs (retail,

Open Access Transmission, etc.), a penalty will be assessed for power factors that are outside of specified requirements in those tariffs.

Capacitors generally provide an effective means of controlling the power factor of a Requester's facility. However, there are several factors that should be addressed in applying capacitors. These factors can include, but are not limited to, transient voltages due to capacitor switching and voltage amplification due to resonance conditions. The services of a qualified consultant should be obtained to review the specific application and provide recommendations in regard to control of these phenomena. Furthermore, facilities connecting to the EKPC system should ensure that capacitor banks utilized for power-factor correction do not result in leading power factor (i.e., injecting reactive power into the transmission system during lower-load periods). Capacitor banks should be de-energized either manually or automatically to prevent this from occurring.

For Transmission Interconnections, EKPC will evaluate whether the connection to the EKPC system creates a significant reactive burden. Potential reactive flows across the new Transmission Interconnection will be assessed for a wide range of conditions. Voltages in the vicinity of the Transmission Interconnection will also be assessed to identify potential degradation on the EKPC system. The Requester will be responsible for addressing any voltage or reactive-flow issues that are created as a result of a proposed Transmission Interconnection.

All facilities interconnected to the EKPC transmission system should have the tap ranges and self-regulation necessary to accommodate the transmission system's reactive power-flow requirements, voltage operating range, and voltage-regulation requirements. All facilities should be designed to be capable of operating within these voltage/reactive requirements and ranges.

Any reactive-compensation devices (synchronous condensers, static var compensators, STATCOM, etc.) associated with a facility connected to the EKPC transmission system must be coordinated with EKPC and/or PJM. EKPC will review and approve installation of any such devices prior to the device becoming operational, and will also review and approve any change to any such device installed within the EKPC system prior to such change occurring.

9.1 Generation Power Factor Requirements

The Interconnection Customer shall design its generating facility to maintain a composite power delivery at continuous rated-power output at the Point of

Interconnection at a power factor within the range of 0.95 leading to 0.95 lagging. Power factor requirements for new generator interconnection requests and increase to existing generators are documented in PJM Manual 14G (Generation Interconnection Requests) in the Generator Power Factor Requirement section.

If an engineering study demonstrates that the Generating Facility cannot meet the reactive supply requirements, the Generating Facility must install power-factor correction devices to support the VAR requirements in the local area.

9.2 Generation Voltage Schedules

All generators must contribute reactive power to the transmission system in order to maintain its reliability. NERC Reliability Standards require that Generator Owners and transmission providers work jointly to optimize the use of reactive-power capability. Therefore, all generators interconnected with the EKPC transmission system are required to maintain a prescribed voltage schedule in order to support VAR requirements in the local area.

The generation facility must be capable of continuous non-interrupted operation at a specified voltage set-point that is within a steady-state voltage range during both system normal and single-contingency conditions, as specified in PJM Manual 3. EKPC presently specifies that generation facilities connecting to the EKPC transmission system follow PJM's Default Generator Voltage Schedules specified in Manual 3, which includes the set-point and bandwidth based on the transmission voltage level at which the generation facility requests connection. During emergency and/or transient-system conditions, when voltage may temporarily be outside of this range, all reasonable measures should be taken to avoid tripping the generator due to high or low voltage. Internal plant design (e.g., transformer ratings/taps/impedance, cooling systems, motors and other loads, generator/exciter, and voltage regulator) should not limit operation within the transmission system's allowable voltage range and regulation.

EKPC's transmission system is designed to operate between 92% and 105% of nominal voltage during normal and single-contingency conditions. If the requirements of the facility owner's equipment is more restrictive than these limits, the installation of voltage-regulation devices by the Facility Owner should be considered.

Specification of the generator voltage schedule will be provided to the interconnected generating facility by EKPC personnel through PJM's eDART application,, with input and oversight by PJM. EKPC will exercise reasonable

efforts to provide the Interconnection Customer with such schedules at least one (1) day in advance and may make changes to such schedules as necessary to maintain the reliability of the transmission system.

The Interconnection Customer shall operate the generating facility to maintain the specified output voltage (or power factor, if appropriate) at the Point of Interconnection within the design limitations of the generating facility set forth above. This may require operation of the interconnected generating facility to its maximum reactive capability when necessary to maintain the specified voltage schedule. If the Interconnection Customer is unable to maintain the specified voltage (or power factor), it shall promptly notify EKPC and PJM.

The analog signal for the bus voltage on the EKPC side of the POI will be provided to interconnected generation facilities via fiber communication path in order to facilitate adhering to the required voltage schedule by the generation facility. This will ensure that the bus voltage values being utilized for generator voltage control are consistent with EKPC real-time values.

All synchronous generators connected to the EKPC transmission system must have an excitation system/Automatic Voltage Regulator (AVR) capable of maintaining the generator output voltage within limits for generator output from no-load up to rated maximum output. These generators will be operated with their excitation systems in the automatic voltage-control mode, unless approved otherwise by PJM. PJM and EKPC shall be notified any time an Automatic Voltage Regulator (AVR) is taken out of service.

All synchronous generators connected to the EKPC transmission system shall be equipped with speed-governing capability. This governing capability shall be unhindered in its operation.

Whenever the generating facility is operated in parallel with the transmission system, and the speed governors (if installed on the generating unit pursuant to Good Utility Practice) and voltage regulators are capable of automatic operation, the Interconnection Customer shall operate the generating facility with its speed governors and voltage regulators in automatic operation. If the generating facility's speed governors and voltage regulators are not capable of such automatic operation, the Interconnection Customer shall immediately notify EKPC's System Operator, or its designated representative, and ensure that such generating facility's reactive-power production or absorption (measured in MVARs) are within the design capability of the generating facility's generating unit(s) and steady-state stability limits.

Voltage-regulator load compensation may be required to control voltage at a point beyond the generator terminals for a new generator interconnected to the EKPC transmission system. All appropriate excitation-system settings of an interconnected generator must be coordinated with EKPC.

Voltage-regulator droop compensation may be required for generators whose terminals are directly connected. EKPC will evaluate this and provide any required droop compensation, as appropriate.

The Interconnection Customer shall not cause its generating facility to disconnect automatically or instantaneously from the transmission system or trip any generating unit comprising the generating facility for an under-frequency or over-frequency condition unless the abnormal frequency condition persists for a time period beyond the limits set forth in ANSI/IEEE Standard C37.106, or such other standard as applied to other generators connected to the EKPC transmission system on a comparable basis.

The Interconnection Customer shall provide a current-limiting device for the generating unit's excitation system that will act in conjunction with, or supersede, the AVR to automatically reduce excitation so that generator field current is maintained at the allowable limit in the event of sustained under-voltages on the transmission system. This device must not prevent the exciter from going to and remaining at the positive ceiling following the inception of a fault on the power system. The setting for the amount of time that the exciter is allowed to remain at the positive ceiling shall be provided to EKPC upon request.

The Interconnection Customer shall equip the generating unit with a limiter to prevent instability resulting from generator under-excitation.

The Interconnection Customer shall coordinate the Generator Step-Up (GSU) and auxiliary transformer impedances and tap specifications with EKPC. EKPC may require the Customer to change these values either prior to connection or after the generating facility has become operational to meet voltage-schedule and/or reactive-support requirements, as warranted by transmission-system analyses.

The Interconnection Customer shall ensure that the full range of generator reactive-power capability is available for applicable normal and emergency network-voltage ranges.

Generation Facilities connected to the EKPC transmission system shall provide at least one non-EKPC source of A/C power for internal plant needs. The EKPC transmission system may be used as a primary or a secondary source of station power but cannot be used for both.

Generation Facilities must have their own battery and control-system enclosures independent from any EKPC battery and control enclosures.

Power factor requirements for new generator interconnection requests and for capacity increases to existing generators are documented in PJM Manual 14A in the Additional Generator Requirements section, which is incorporated herein by reference.

Specific requirements for voltage regulators, power-system stabilizers, governor controls, and remote control and telemetry of such devices will be determined during the Facilities study. The specific requirements for a generator interconnection request will become part of the Interconnection Service Agreement (see PJM Manual 14A).

10.0 Power Quality Impacts

Power quality studies will be performed, as deemed necessary by EKPC, to define acceptable operating ranges and limits. Studies may include, but not be limited to, the following design parameters:

- Harmonic Distortion
- Voltage Fluctuation
- Voltage Flicker
- Sensitive Electrical Equipment
- Transformer Protective Devices
- Unbalanced Electrical Conditions
- Sub-synchronous Torsional Interaction
- Transient Over-voltage
- Temporary Over-voltage
- Temporary Under-voltage
- Operating Frequency
- Interruption/Outage Frequency
- Unbalanced Voltage
- Insulation Coordination

- Power Factor Range

Studies may identify additional equipment necessary to meet power-quality standards.

Connection of a generator, transmission facility, or end-user load to the EKPC transmission system should not unacceptably compromise or degrade the power quality for existing EKPC customers.

Installation of power quality monitoring equipment by EKPC and/or the owner of an interconnected facility may be required to verify compliance with EKPC's power quality performance requirements.

10.1 Harmonic Distortion, Voltage Fluctuations and Voltage Flicker

Certain electrical equipment located at the Requester's facility (arc furnaces, cyclo-converters, data-processing facilities, etc.) may generate voltage flicker and harmonic distortion, which can negatively impact the EKPC system. Should this be the case, the Requester shall take responsibility, initially or in the future, for limiting interfering levels of harmonic voltage, current distortion, and/or voltage flicker. Limits for harmonic distortion (including inductive telephone influence factors) are as published in the latest issues of ANSI/IEEE 519, "Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems." EKPC may, initially or in the future, require the installation of a monitoring system to permit ongoing assessment of compliance with these criteria. The monitoring system, if required, will be installed at the Requester's expense.

Situations where high harmonic voltages and/or currents originate from the transmission system are to be addressed in the connection agreement.

EKPC will evaluate requests for Transmission Interconnection to identify potential unacceptable voltage flicker and/or harmonic distortion that would be created by the Transmission Interconnection. The Requester will be responsible for any mitigation that is required.

Voltage flicker limits are as specified in IEEE Standard 141-1993. Voltage fluctuation limits are as specified in the applicable IEC-61000 set of standards. Steady-state voltages should remain within the voltage limits prescribed in Section 3.0.

10.2 Sensitive Electrical Equipment

Certain electrical equipment in the Requester's facility may be sensitive to normally occurring electric interference from nearby connected loads in the Requester's facility, from other End-Users connected to the power system, from natural causes, system switching activity, etc. If sensitive electrical equipment is to be supplied directly from the electric-power system, Requester or Requester's consultant should examine the equipment grounding requirements and power-supply requirements prior to installation. Attention should be given to equipment tolerance to various forms of electric interference, including voltage sags and surges, momentary outages, transients, current and voltage harmonic distortion, or other electrical and electromechanical noise. When electrical disturbances to sensitive electrical equipment such as computers, electronics, controls, and communication equipment cannot be tolerated, the End-User shall install additional equipment as may be necessary to prevent equipment malfunctions and protect against equipment failure. The End-User should consult the supplier of such sensitive electrical equipment regarding the power supply requirements or the remedial measures to be taken to alleviate potential mis-operation or failure of the equipment. The End-User may need to hire a power-quality consultant to also perform a site survey of the electric power-supply environment and furnish recommendations to provide the acceptable levels of reliability and quality of service.

10.3 Unbalanced Electrical Conditions

Situations where high unbalance -- in voltage and/or current -- originate from the transmission system are to be addressed in the Connection Agreement.

10.3.1 Voltage Balance

Voltage unbalance attributable to the End-User facilities shall not exceed 1.0% measured at the point-of-service. Voltage unbalance is defined as the maximum phase deviation from average as specified in ANSI C84.1, "American National Standard for Electric Power Systems and Equipment – Voltage Ratings, 60 Hertz."

10.3.2 Current Balance

Phase current unbalance attributable to the End-User facility should not exceed 10% measured at the point of delivery.

10.4 Sub-synchronous Torsional Interaction

Certain End-User equipment, in particular electric arc furnaces and cyclo-converters, may cause adverse interactions and possible damage to existing turbine-generators located in close electrical proximity. These situations will be analyzed by EKPC, or EKPC's consultant, and appropriate corrective or preventive measures identified as needed. Corrective and preventive measures may consist of torsional current monitoring at a defined point of compliance, special protective relaying on the turbine-generator shaft(s), or constrained operation of the End-User equipment under certain system configurations. Costs of studies and the design and installation of protective and/or monitoring equipment shall be the responsibility of the Requester.

10.5 Transient and Temporary Over-voltages

The design of facilities connected to the EKPC transmission system must address the mitigation of transient and temporary over-voltages that may be caused by lightning strikes, faults, breaker switching, etc. A facility connected to the EKPC transmission system shall not cause a peak transient voltage at the Interconnection Point that is 140% or more of the nominal system voltage. Furthermore, a facility connected to the EKPC transmission system shall not cause a peak temporary voltage (lasting greater than 20 milliseconds) at the Interconnection Point that is 120% or more of the nominal system voltage.

10.6 Temporary Under-voltages

A facility connected to the EKPC transmission system should not result in more than two occurrences in a 12-month period of a voltage level at the Interconnection Point that remains at 85% or less of the nominal system voltage for more than 20 milliseconds. During non-fault conditions, the voltage at the Interconnection Point should be at least 92% at all times.

10.7 Operating Frequency

The nominal operating frequency of the EKPC transmission system is 60 Hz. Operation of any facility connected to the EKPC system shall be designed for this frequency. The facility should not contribute to any variation from this frequency. As discussed in section 5.2, an End-User Facility may be required to participate in EKPC's automatic under-frequency load-shedding program. EKPC will also assess the impacts of generation and transmission facilities on system frequency to ensure that adequate protection exists to prevent significant frequency excursions from nominal system frequency.

10.8 Interruption/Outage Frequency

EKPC operates and maintains its system to provide reliable and safe service at all times. Connection of a facility to the EKPC system requires that connected equipment not restrict timely outage coordination, automatic switching, or equipment maintenance scheduling. If a facility is determined to present a potential risk to the reliability of the EKPC transmission system, additional switchgear, equipment redundancy, or bypass capabilities at the Interconnected Facility may be required.

The Interconnected Facility shall not cause an unplanned interruption/outage of another facility on the EKPC system more than once in any twelve-month period.

11.0 Equipment Ratings

EKPC shall own all equipment that is installed within existing network paths. For tap connections, this means that EKPC will own all switches installed at the tap point (those installed within the existing line as well as the switch installed on the new tap at the tap point). For looped connections, this means that EKPC will own all equipment installed for termination of EKPC lines, as well as isolation equipment for connection of the new facility. Both EKPC and the Requester should design the facility equipment so that ratings are comparable and neither Party restricts the capability of the new connection excessively.

The Requester shall establish and communicate equipment ratings in accordance with industry standards and EKPC's Facility Ratings Methodology, including those systems below 100kV. EKPC Transmission Facility Ratings Methodology is consistent with NERC Reliability Standard FAC-008. EKPC and PJM shall be notified of equipment ratings at a minimum of 9 months prior to energization. All substations connected to the EKPC system shall meet the requirements of EKPC's and the Rural Utilities Service (RUS) substation design and construction standards/guides and must be designed to the applicable requirements of NESC, ANSI, and IEEE Standards. All interrupting devices, such as circuit breakers shall have interrupting capability sufficient to satisfactorily interrupt the maximum short-circuit currents that may occur at the location of the interconnection, including margin for circuit-breaker duty and DC offset as described in Section 4.1. Where the substation becomes a facility within the intercepted path, EKPC shall design, construct, own, and maintain the facility at the Requester's expense.

For transmission lines interconnecting into EKPC's facilities, transmission line ratings shall meet the requirements of EKPC's transmission line design standards, including MVA, operating voltage, ampacity, insulation critical flashover, insulation clearances, basic insulation levels, shielding, tower grounding, attachment details, surge protection, current-carrying elements, and short-circuit withstand requirements. In all cases the National Electrical Safety Code (NESC) and OSHA requirements shall be satisfied. The Requester shall make available to EKPC all drawings and specifications, termination plans, and equipment ratings. EKPC shall review and approve these with regard to potential impacts on the reliability and operation of the EKPC transmission system.

The effects resulting from atmospheric, geological, seismic, or environmental conditions (such as wind storms, floods, lightning, altitude, temperature extremes, earthquakes, etc.) shall be considered in the design and operation of a facility connected to the EKPC system. Depending on the location, size, type, etc., of the facility, EKPC may impose additional requirements to be met by the owner/operator.

EKPC, as a borrower from the Rural Utilities Service (RUS), must comply with all RUS regulations, including, but not limited to, the NEPA environmental clearance processes. Any project involving connection to the EKPC transmission system must comply with these regulations.

Any equipment changes on the EKPC transmission system necessitated by connection of a new facility to the EKPC system will be performed by EKPC at the expense of the owner of the new facility requesting interconnection to the EKPC system. The proposed facility may not be allowed to connect to the EKPC system, or the facility's operations may be restricted, until any EKPC system limitations and requirements have been addressed.

12.0 Synchronizing of Facilities

An interconnected facility owner/operator shall obtain the approval of both EKPC and PJM prior to either synchronizing with the transmission system or energizing the facility, as applicable per the determination of EKPC and PJM. Except in an emergency condition, the interconnected facility owner/operator shall obtain the approval of both EKPC and PJM prior to disconnecting from the transmission system.

All Requester's facilities, -- which include transmission interconnections, End Users with backup generation and all generation owners -- capable of independent voltage support or power supply, shall have equipment to measure or check for synchronism of the facility with the EKPC system. Connection or reclosing of the facility shall not be allowed for out-of-sync conditions to protect the EKPC and Requester's systems from damage or loss of stability. Automatic reclosing of generation facilities connected to the EKPC transmission system is prohibited. Also, reclosing of transmission lines connected to a substation associated with a generation facility is generally prohibited by EKPC. Automatic reclosing of transmission interconnections may be allowed if both Parties agree that this is acceptable and will not present potential significant reliability or safety impacts. Remote synchronizing to the EKPC system will be acceptable provided the Requester has adequate sync- check equipment installed and approved by EKPC, at its facility.

The Requester shall assume all responsibility for properly synchronizing its generation for operation with the EKPC Transmission System. Upon loss of the EKPC supply, the Requester shall immediately and positively cause the generation to be separated from the EKPC system. Synchronizing of generation to the EKPC Transmission System may be, at EKPC's discretion, performed under the direction of the EKPC Control Center.

All synchronizing equipment should be tested during commissioning of the equipment to ensure proper operation. Equipment that is in service should be tested periodically in accordance with Good Utility Practice.
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13.0 Maintenance Coordination and Scheduled Outages

The Requester should have a documented maintenance program specifying the specific maintenance activities to be performed on all equipment associated with the Requester facility and the specific intervals for inspection, testing, and maintenance. The goal of the maintenance program is to maintain a high level of reliability for the transmission system. Therefore, maintenance activities should be performed proactively to avoid unplanned outages. Maintenance activities should be planned for lower-load periods to avoid the possibility of stressing the system due to outages during periods of high-load levels.

In planning outages of generating units, unit commitment obligations, replacement power requirements, and/or contractual obligations that impact the performance of the bulk power system should be considered by the Requester.

The Requester is to consult and coordinate with EKPC on all requests for outages to a Requester's facility that affects the EKPC Transmission System. All generation and transmission outage requests should be submitted with appropriate lead time satisfying the PJM outage submittal rules, as descried in the PJM Manual 03. Outage requests should be made according to the schedule outlined in EKPC's Outage Submission and Coordination document. All requests will be evaluated by EKPC and/or PJM to determine if the outage can be taken without impacting system reliability, generation maintenance schedules, generation dispatch requirements, transmission transaction schedules, area protection or voltage requirements. After approval of the Requester's outage request by EKPC and, if applicable PJM, the transmission operators at EKPC will follow EKPC's Lock Out and Tag Out Procedure to provide switching instructions to field personnel, issue Hold Cards and/or Caution Orders, and to issue safety working clearances to field personnel.
All Requester-owned equipment up to and including the first protective fault interrupting device is to be calibrated and maintained to EKPC standards. This may include substation equipment such as circuit breakers, circuit switchers/interrupters, power fuses, instrument transformers, switches, surge arresters, bushings, relays, and associated equipment (including DC systems, grounding systems, etc.). Any Requester-owned transmission line and its associated parts – up to the first fault interrupting device must also be maintained to EKPC standards. Detailed maintenance procedures for the Requester facility equipment shall be provided to EKPC upon request. EKPC is required to follow the NERC Reliability Standard PRC-005 to maintain all equipment necessary to protect the system, and the Requester shall follow this Standard, as appropriate.

The Requester shall have an organization -- approved by EKPC -- test and maintain all devices and control schemes provided by the Requester for the protection of the EKPC system. Included in the testing and maintenance will be any initial set-up, calibration, and check-out of the required protective devices, periodic routine testing and maintenance, and any testing and maintenance necessary for an upgrade or change-out of the protective devices initiated by a Requester or EKPC.

If the Requester's testing and maintenance program is not performed in accordance with EKPC's maintenance requirements, EKPC reserves the right to inspect, test, or maintain the protective devices required for the protection of the EKPC System.

All costs associated with the testing and maintenance of devices provided by the Requester for the protection of the EKPC system, including costs incurred by EKPC in performing any necessary tests or inspections, shall be the responsibility of the Requester.

EKPC reserves the right to approve the testing and maintenance practices of a Requester when the Requester's system is operated as a network with the EKPC transmission system.

The owner/operator of a facility connected to the EKPC transmission system is responsible for the regularly scheduled calibration and/or maintenance of its equipment, including, but not limited to generators, circuit breakers, power transformers, protective relays, revenue metering, communications devices, trip circuits, interrupters, DC power sources, grounding systems, and transmission facilities. Maintenance practices should be consistent with Good Utility Practice, and should be performed at a level that ensures the reliability and continuity of service of the interconnected transmission system. All relevant maintenance records should be maintained and provided to EKPC within 15 business days of a request.

On occasion, EKPC must remove its lines from service for maintenance. EKPC and PJM will coordinate these planned outages with the Interconnected Customer if impacts to the Customer's facility are possible.

The Requester shall be responsible for the design, construction, installation, maintenance, synchronization, and ownership of all interconnection facilities located on its side of the interconnection point(s). EKPC shall be responsible for the design, construction, installation, maintenance, synchronization and ownership of all interconnection facilities located on its side of the interconnection point(s).

14.0 Operational Issues (Abnormal Frequency, Power Flows, and Voltages)

PJM is the Transmission Operator for the EKPC transmission system. An interconnected facility will be operated consistent with PJM requirements and procedures. Specific transmission conditions and procedures for operation of transmission facilities within PJM are found in PJM Manual 3 (Transmission Operations), which can be found on the PJM website (www.pjm.com).

Operational issues on EKPC's system, either during normal or emergency conditions, may affect EKPC's control performance, or cause real-time abnormal

power flows. Under certain conditions the Requester may have to install disturbance monitoring and/or control equipment as appropriate and detailed in Section 5 above. For abnormal power flows on the EKPC transmission system, the Requestor may be asked to temporarily reduce maximum output of their generation facilities until the event is concluded, or a mitigation is in place. If the interconnection customer did not opt to complete upgrades to facilitate maximum capacity and energy output of their generation project, then any off-cost dispatch needed to mitigate transmission issues for which their interconnection project is directly contributing will be solely at their expense and not at EKPC's.

EKPC shall review and approve general protection settings for any request to connect a Generation, Transmission, or End-User Facility to the EKPC transmission system. EKPC will ensure that the proper coordination is in place between the EKPC protection systems and the Requester protection systems. EKPC will also ensure that the Requester abnormal frequency protection scheme meets EKPC requirements and that proper metering equipment is in place to monitor abnormal voltage conditions.

Design requirements to be addressed for facilities connected to the EKPC system include:

- Consideration for abnormal voltage conditions
- Consideration for abnormal frequency conditions
- Consideration for generators connected through a tapped transmission line (e.g., islanding)
- Relay coordination to maintain stability
- Load shedding implementation

Operational requirements to be addressed for facilities connected to the EKPC system include:

- Provisions for abnormal voltage conditions
- Provisions for abnormal frequency conditions
- Provisions for load shedding
- Special procedures for coordination
- Provisions for temporary reductions in maximum generation output

Some of these design and operational items are covered generally in other sections of this document. EKPC will coordinate with the Requester regarding these specific requirements for each facility to be connected to the EKPC system.

A generation interconnection customer shall implement under-frequency and over-frequency relay set points as required by PJM to ensure "ride-through" capability of the transmission system. The generation interconnection customer's facility is to stay connected to and synchronized with the EKPC transmission system during system disturbances within a range of under-frequency and over-frequency conditions, in accordance with Good Utility Practice. The response of a generation interconnection facility to frequency deviations of predetermined magnitudes; both under-frequency and over-frequency deviations are studied and coordinated with PJM in accordance with Good Utility Practice. Additional information is described in PJM Manual 14D, which can be found on the PJM website (www.pjm.com).

15.0 Inspection Requirements

The Requester is responsible for installing appropriate equipment and facilities to be compatible with the EKPC Transmission System. The Requester is also responsible for meeting any applicable federal, state, and local codes.

EKPC will review, in collaboration with PJM, the general design of the protection scheme for an interconnected facility. The Interconnection Customer is responsible for the design of the protection that involves the Customer facilities. The Interconnection Customer must provide EKPC with the proposed settings for its relays.

The Interconnection Customer must notify EKPC and PJM at least 14 days before energization of interconnected equipment. Before a Requester-owned facility can be energized, it must pass a final inspection and witness testing by EKPC personnel. EKPC, in conjunction with PJM, will set the testing requirements for all tests that must be witnessed. EKPC will inspect all substation equipment from the point of interconnection to the first protective fault-interrupting device. This may include circuit breakers, circuit switchers, power fuses, instrument transformers, switches, surge arresters, bushings, and relays and associated equipment (including DC and grounding systems). The inspection will consist of a visual inspection of all major equipment as well as review of required test results. Nameplate information on all equipment will need to be recorded and given to EKPC prior to final inspection. Initial energizing of high-voltage circuits will not be allowed until the site design has been approved and all requirements of the PJM Tariff have been satisfied. Energization of equipment without required approval may result in disconnection from the EKPC system.

The grounding system must be checked before any overhead ground wires are attached from outside lines, by using the resistance measurement procedures in accordance with IEEE Standard 81 "Recommended Guide for Measuring Ground Resistance and Potential Gradients in the Earth." The EKPC inspection will be documented by completing a site-specific form supplied by EKPC. An example of the form, showing the types of information required is shown in Appendix C.

EKPC and/or its designee should be allowed access, upon reasonable notification, to Requester's facility for any inspection or testing needs, or for any requirement related to EKPC's compliance with NERC Reliability Standards. The details of EKPC access to the facility and advance notification requirements will be determined when contractual arrangements for the facility connection are developed.

The facility owner/operator may be required to modify the operation of its facility to comply with EKPC testing requirements. EKPC will endeavor to minimize the impacts of its testing on the operation of the facility.

16.0 Communications

For any abnormal system operational issues, emergency telephone numbers agreed on by both parties will be available prior to the actual interconnection date. Under no circumstance shall a Requester energize EKPC transmission facilities that have been de-energized without consent from the EKPC Control Center. Circuits that are electrically disconnected from the EKPC transmission system and are energized by a Requester constitute a potential safety hazard for both EKPC transmission personnel and the general public. Also, the energizing of such circuits at abnormal voltage or frequency could cause damage to electrical equipment of both the EKPC Transmission System and the connected facility.

The Requester is responsible for operating its generation with full regard for the safe practices of, and with full cooperation under the supervision of the EKPC and/or PJM system operators.

The interconnected facility's operator is required to communicate to the EKPC transmission system dispatcher its intention to perform any operational step(s) that could have an influence on the transmission system. This notification is to be made prior to actually performing the configuration changes to the facility's on-site equipment. This advance notification requirement also applies to bringing a generator on-line or taking a generator off-line. Whenever possible, as in the case

of switching activities related to scheduled maintenance work, the advance notice to EKPC should be provided at least 5 days prior to the day of the actual switching activities, unless additional notice is required by PJM. Scheduled maintenance work must be coordinated with EKPC to meet PJM advanced outage notification requirements addressed in the PJM manuals.

The interconnected facility's operator is required to follow PJM and EKPC instruction during emergency conditions (e.g., restoration). Participation in drills conducted by PJM and/or EKPC is required upon request.

The contact person identified by the Requester (as described below) should have the authority and capability to operate its facilities according to the instructions of EKPC and/or PJM.

16.1 Voice Communications

Normal – The Requester shall install and maintain satisfactory operating communications with PJM's system operator or its other designated representative, if it is determined to be necessary. The Requester shall also provide a dedicated voice communication circuit to the EKPC Control Center. Such a dedicated voice communication circuit would originate from the Requester's office staffed 24 hours a day. The Requester shall also provide and maintain backup communication links with both PJM (if required) and EKPC for use during abnormal conditions. It is essential that reliable communications with the EKPC Control Center and PJM (if required) is in place at all times. Therefore, the primary and backup communication links should be completely independent to ensure that no single point of failure removes the communication capability.

All other normal voice communication concerning facility operations shall be conducted through the public telephone network to the Control Center phone number(s) issued by EKPC.

Emergency – Voice communications in the event of a transmission facility emergency shall use the dedicated voice circuits, if available, or public telephone network and phone number(s) designated for emergency use.

It is the Requester's responsibility to take prudent steps when an area or system-wide capacity emergency is declared. Load reductions shall be implemented by reducing non-essential loads. This type of reduction is usually conveyed through the local media. If the Requester operates generating units, EKPC's Control

Center may give specific instructions regarding the operation of the Requester's units, depending on the nature of the emergency.

The End-User is responsible for providing the EKPC Control Center a "customer contact list." This listing contains the End-User's primary contact and backup person as well as business, home and cell-phone numbers.

These End-Users shall be provided an EKPC phone number to be used for emergency or routine operations.

16.2 Interruptible Contracts

Owners of transmission facilities that have an EKPC interruptible contract shall install communication facilities with the EKPC Control Center as specified in the contract.

16.3 Emergency Operating Conditions

All operators of connected facilities should communicate and cooperate with the EKPC Control Center to support recovery efforts during emergency operating conditions. This may include, but may not be limited to the following items:

- Switching operations
- Reactive power support
- Adjustments in real and/or reactive generation output
- Tripping of generating unit(s)
- Starting of generating unit(s), including black-start units
- Implementation of emergency communication procedures
- Transmission facility restoration efforts

End-User's facilities may be subject to EKPC's System Restoration Plan that can require interruption of load to deal with generation deficiencies and/or transmission system emergencies. It is noted that interrupting of load will only be done in extreme conditions that would result in a more serious degradation of system performance than if the load were not shed.

17.0 Coordination with Other Codes, Standards, and Agencies

The information contained in this document is supplementary to and does not intentionally conflict with or supersede the National Electric Code (NEC) and the National Electric Safety Code (NESC) as approved by the American National Standards Institute (ANSI) or such federal, state and municipal laws, ordinances, rules or regulations as may be in force within the cities, towns or communities in which EKPC furnishes electric service. It is the responsibility of the Interconnection or End-User Requester to conform to all applicable national, state and local laws, ordinances, rules, regulations, codes, etc.

18.0 Indemnification

The use and reliance upon the information contained in this document shall in no way relieve the Requester or Facility Owner from the responsibility to meet NEC, NESC, ANSI, etc. requirements governing their design, construction, operation, and materials or from responsibility for the protection and safety of the general public.

Parties wishing to connect to the EKPC transmission system shall agree to the following terms to be included in any Interconnection Agreement:

Indemnity by (Entity)
(Entity) agrees to defend, indemnify and hold harmless EKPC, its directors, officers, employees and agents, from any and all damage, loss, claim, demand, suit, liability, penalty, or forfeiture of every kind and nature- including but not limited to attorney fees and other costs and expenses of defending against the same and payment of any settlement or judgment therefore, by reason of a) injuries or deaths to persons, (b) damages to, destruction of or interference with the use of properties, (c) pollutions, contaminations of or other adverse effects on the environment or (d) violations of governmental laws, regulations, or orders- whether suffered directly by EKPC itself or indirectly by reason of claims, demands or suits against it by third parties, resulting or alleged to have resulted from: acts or omissions of (Entity), its employees, agents, subcontractors or other representatives or from their presence on the premise of EKPC; from adverse impacts on EKPC's system, or other connected systems resulting from (Entity's) design, construction or operations of its facilities; or otherwise from performance of this Interconnection Agreement.

19.0 DEFINITIONS AND ABBREVIATIONS

19.1. Definitions

Wherever used in this document with initial capitalization, the following terms shall have the meanings as specified below.

• Advanced Inverter—A grid interactive Static Inverter with functions to allow for more elaborate monitoring and communication of the grid status, the ability to receive operation instructions from a centralized location, and the capability to make autonomous decisions to improve grid stability, support power quality, and provide ancillary services such as voltage regulation, power-factor control and reactive-power control

•Automatic Reclosing—The act of automatically re-energizing a utility power line in an attempt to restore power following a fault on the line

• Backfeed—To energize any section of the EKPC System from an electric source other than the normal utility source

• Capacity—The seasonal maximum generating capability of the Requester's facility, measured in megawatts.

• Clearance—A statement by one having complete authority over all parts of a circuit or piece of electrical equipment that said circuit or equipment is disconnected from all known sources or power. It is assurance that all proper precautionary measures have been taken and workers may proceed with grounding the circuit.

• EKPC Interconnection Requirements: The requirements set forth in this document entitled "EKPC Facility Connection Requirements" and all additional requirements that are referenced in this document.

• Emergency Condition(s)—A condition or situation (i) that in the judgment of either party is imminently likely to endanger life or property; (ii) that in the sole judgment of EKPC is imminently likely to affect adversely or impair the Transmission System or imminently will affect or impair the transmission systems of others to which the Transmission System is directly or indirectly connected; or (iii) that in the sole judgment of the Requester is imminently likely to adversely affect or impair the facility. Such a condition or situation includes, but is not limited to, overloading, or potential overloading of transmission system or Requester facility equipment, excessive voltage drop, or other unusual operating

conditions on the Transmission System or the Requester's facility such that the output of the facility must be shut down or curtailed to avoid damaging the facility or the Transmission System.

• End-User Facilities (Requester's)—The facilities which are owned and operated by the End-User and which interconnect to the Transmission System.

• Energy Storage—The capture of energy produced at one time for use at a later time. A device that stores energy with the potential to backfeed

• Fault Current—The level of current that can flow if a short circuit is applied to a voltage source

• Generating Facility—All or part of End-User's electrical Generator(s) and/or Energy Storage together with all protective, safety, and associated equipment and improvements associated with the interconnection to, or operation in conjunction with, the EKPC System.

• Good Utility Practice— Any of the practices, methods, and acts engaged in or approved by a significant portion of the electric utility industry during the relevant time period, or any of the practices, methods and acts that, in the exercise of reasonable judgment in light of the facts known at the time the decision is made, could have been expected to accomplish the desired result at a reasonable cost consistent with good business practices, reliability, safety and expedition. Good Utility Practice is not intended to be limited to the optimum practice, method, or act to the exclusion of all others, but rather is intended to include acceptable practices, methods, or acts generally accepted in the region.

• Governmental Laws—Any law required by federal, state, local or other governmental, regulatory or administrative agency, court, commission, department, board, or other governmental subdivision, legislature, rulemaking board, tribunal, arbitrating body, or other governmental authority.

• Interconnection Facilities—All structures, equipment, devices and apparatus owned or leased by, or under contract to each party presently in place or proposed to be installed, which are necessary to connect the Interconnection Requester's facility(ies) to the EKPC Transmission System.

• Interconnection Facilities Study—A study or studies that may be undertaken by EKPC/PJM (or an EKPC/PJM designated third party) in response to its receipt of a completed Application for Interconnection and parallel operation with the EKPC

System. Interconnection studies may include, but are not limited to, Interconnection Feasibility Studies, System Impact Studies, and Facilities Studies

• Interconnection Customer—A transmission, generation, or end user connected to, or seeking to connect to, the EKPC Transmission System.

• Interconnection Point—The point at which the Facilities are physically connected to the Transmission System (including any Distribution Facilities required to facilitate the interconnection).

• Island—A condition in which a portion of a Utility electric power system is energized solely by one or more local electric power systems throughout the associated Point of Interconnection while that portion of the Utility electric power system is electrically separated from the rest of the Utility electric power system.

• Metering Equipment—All metering equipment currently installed at the Requester's facility and/or any other metering equipment to be installed at the metering points designated in the Interconnection Facilities, including Revenue Meters.

• Parallel Generation Facility—A generating facility that electrically parallels with the EKPC System for more than 15 seconds.

• Point of Interconnection (POI) —The physical location where EKPC's service conductors are connected to a Requester's conductors, bus, and/or service equipment to allow operation of Requester's facility with the EKPC System. Also referred to as the Point of Common Coupling (PCC).

RTO—A Regional Transmission Organization or any successor thereof which becomes responsible for operating the EKPC Transmission System to which the Requester's facility is connected. PJM Interconnection, L.L.C. is EKPC's RTO.

• Static Inverter—An electronic device (or devices) used to convert direct current (DC) power into alternating current (AC) power.

• Transfer-Trip Scheme: —A trip in which a communication channel is used to transmit a trip signal from the relay location (e.g. utility substation) to a remote location (e.g. Generating Facility).

• Transmission Element —Transmission elements are primary equipment (69kV and above) that constitute, or interconnect with, the EKPC Transmission System.

Examples include buses, lines, or transformers with low-side voltage 69kV or above, regardless of Bulk Electric System status.

• Transmission System—The facilities owned by EKPC that are used to provide transmission service under the PJM OATT.

• UL 1741 SA—UL Standard Supplement A for Advanced Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources

19.2. Abbreviations

Wherever used in this document with initial capitalization, the following terms shall have the meanings as specified below. Terms used in this document with initial capitalization not defined shall have the meanings specified in the PJM Open Access Transmission Tariff.

• ANSI—American National Standards Institute
• EKPC—East Kentucky Power Cooperative
• FERC—Federal Energy Regulatory Commission
• IEEE—Institute of Electrical and Electronic Engineers
• NERC—North American Electric Reliability Corporation
• NRTL—Nationally Recognized Testing Laboratory.
• OATT—PJM Open Access Transmission Tariff
• OSHA—Occupational Safety and Health Administration.
• PCC—Point of Common Coupling
• SERC— SERC Reliability Corporation
• UL— Underwriters Laboratories Inc

APPENDIX A – Typical Interconnection Configurations

Figure 1 --Typical Distribution Tap Configurations Below 200 kV

Figure 2 – Typical Generation Interconnection to Existing Transmission Line at 69 kV

Figure 3 – Typical Generation Interconnection to Existing Transmission Line Above 69 kV

Figure 4 – Typical Transmission or Generation Interconnection to Existing Substation Bus

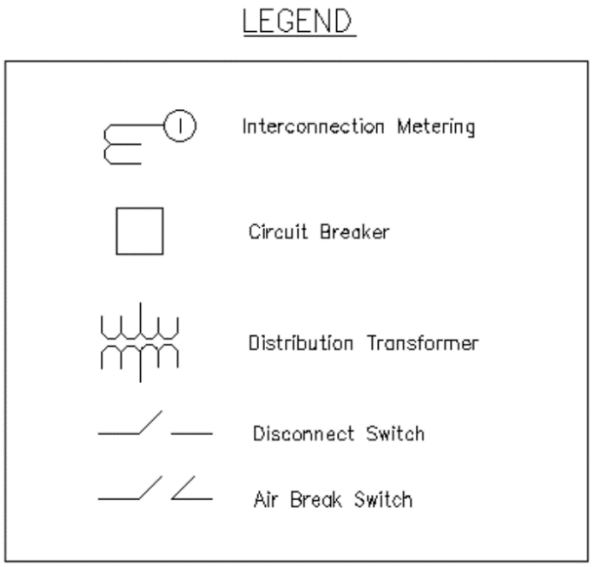


FIGURE 1: Typical Distribution Tap Configurations below 200 kV

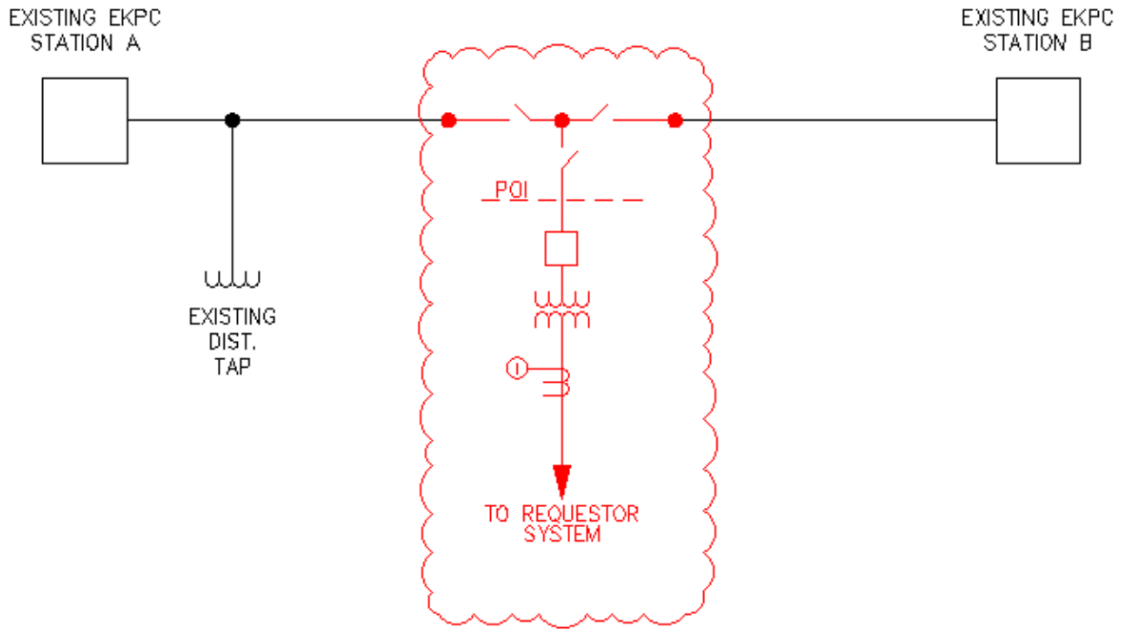


FIGURE 2: Typical Generation Interconnection to Existing Transmission Line at 69 kV

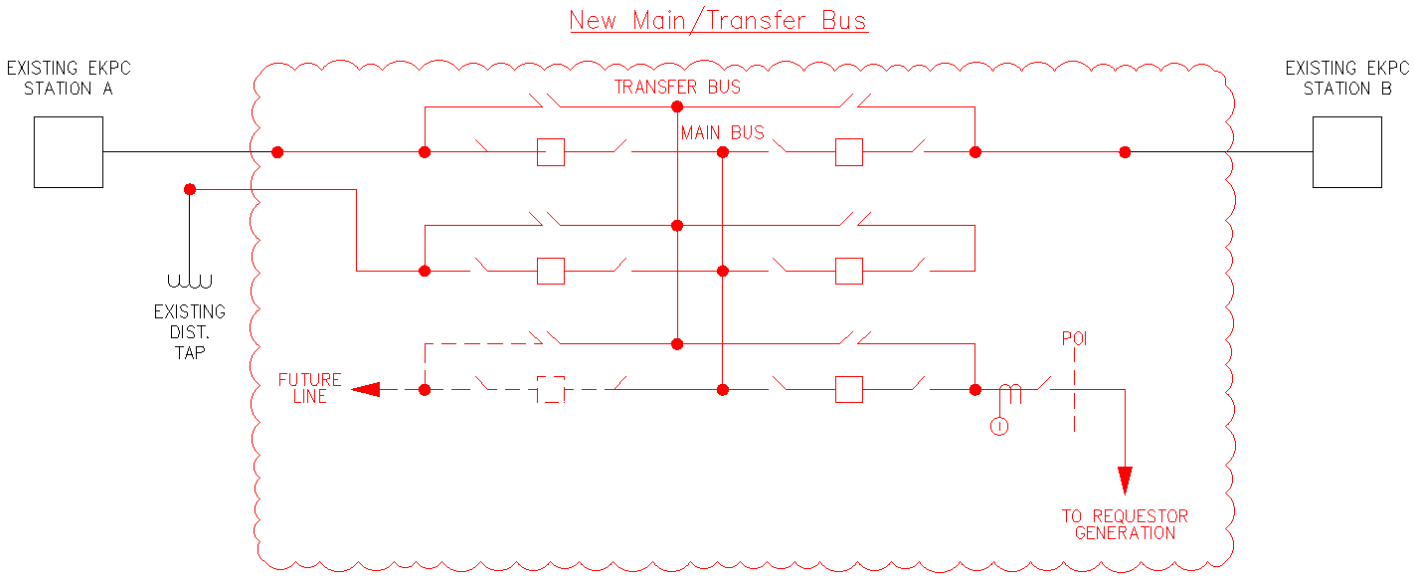


FIGURE 3: Typical Generation Interconnection to Existing Transmission Line Above 69 kV

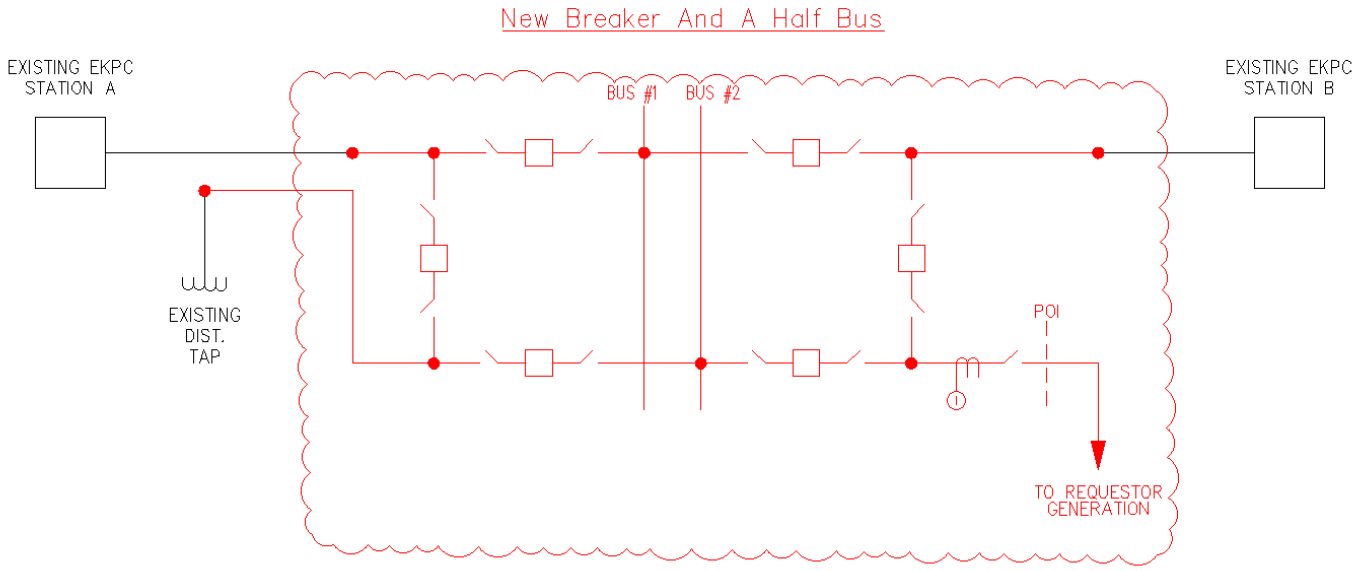
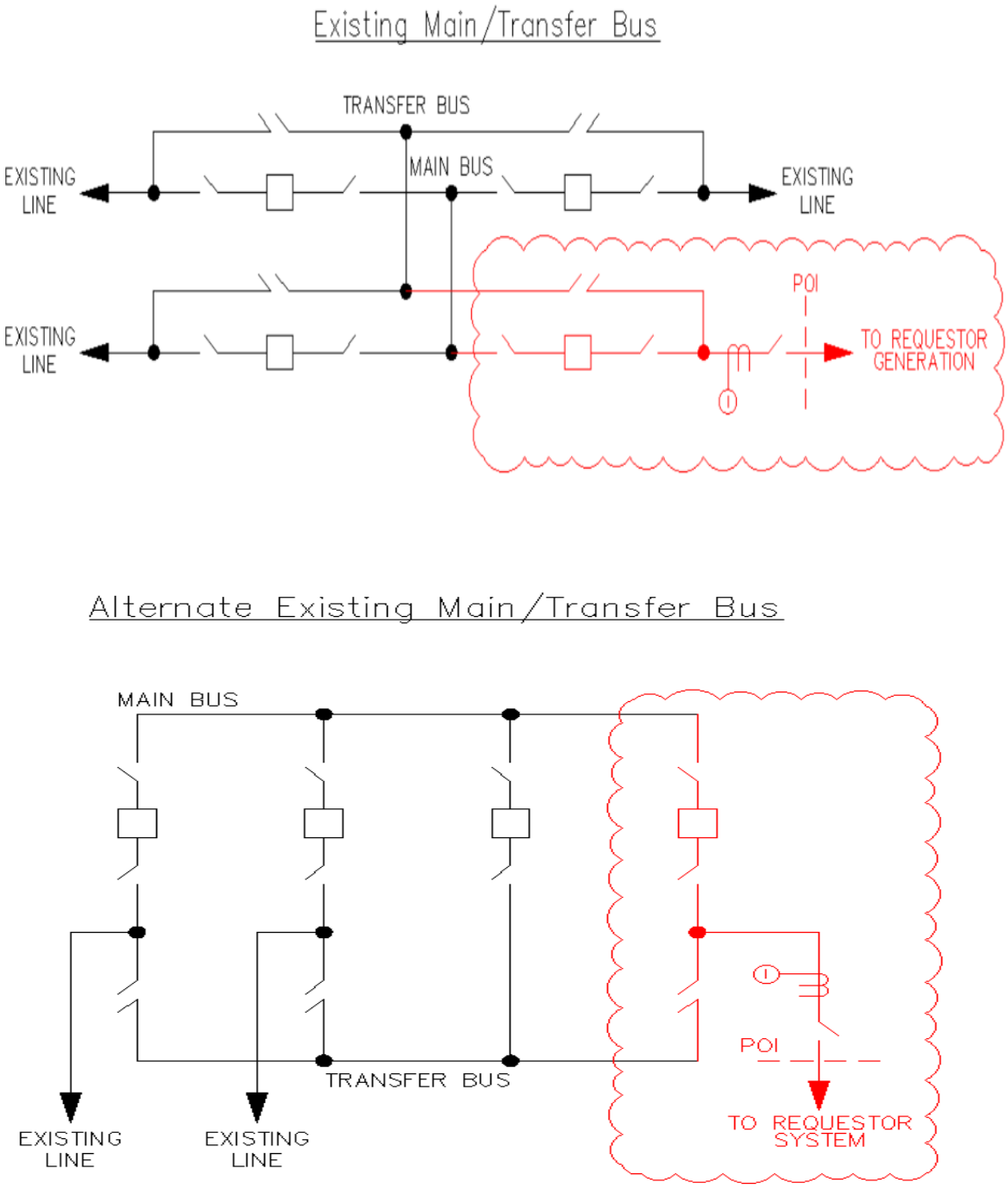
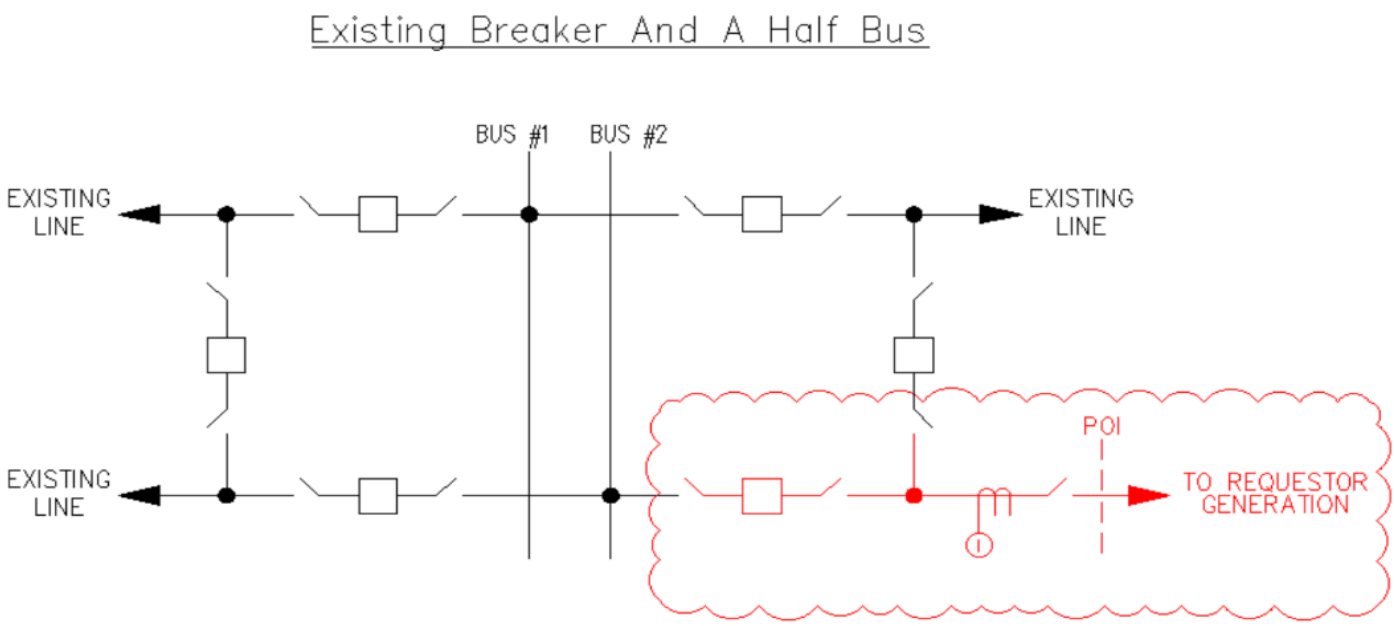


FIGURE 4: Typical Transmission or Generation Interconnection to Existing Substation Bus




Existing Breaker And A Half Bus
BUS #1
BUS #2
EXISTING LINE
EXISTING LINE
EXISTING LINE
POI
TO REQUESTOR GENERATION

APPENDIX B

Electrical Clearances and Equipment Ratings

ELECTRIC CLEARANCES

Nominal System Voltage (kV)	Basic Impulse Insulation Level (BIL) (KV crest) (1)		Outdoor Design Clearance (in.)				Air Insulated Switch Design Clearance (in.)	
							Air Break (All Horn Gap)	Disconnect Vert / Horiz Break Break
	Bus & Transformer Winding	Transformer Bushing	Centerline-Ground		Centerline-Centerline (Typical)		Phase Spacing	Phase Spacing
			Rigid Bus	Strain Bus	Rigid Bus	Strain Bus		
345	1300	1300	106	146	174	218	240	174 / NA
161	750	750	63	86	108	138	168	108 / 156
138	650	650	53	68	96	120	144	96 / 132
69	350	350	29	36	60	72	84	60 / 72

(1) Substations in heavily contaminated areas may require a higher insulation level than indicated.

(2) RUS Bulletin 1724E-300 "Design Guide for Rural Substations" contains additional information on all aspects of outdoor substation design. This reference is available for downloading at no cost from the RUS website: http://www.usda.gov/rus/electric/ .

APPENDIX C

Inspection Requirements

Appendix D

CONNECTING FACILITY
Electrical Facility Checkout Guide

ITEM		ACTION/INFORMATION	BY	DATE
1. Facility Ground Resistance		Review Test Results	_____	_____
2. Air break and Disconnect Switch Alignment				
a. Switch Device Number	____	Visual Inspection	_____	_____
b. Switch Device Number	____	Visual Inspection	_____	_____
c. Switch Device Number	____	Visual Inspection	_____	_____
d. Switch Device Number	____	Visual Inspection	_____	_____
e. Switch Device Number	____	Visual Inspection	_____	_____
f. Switch Device Number	____	Visual Inspection	_____	_____
3. Circuit Breakers				
a. ___kV Circuit Breaker *Device Number* _____				
1. Gas Filled		Visual Inspection	_____	_____
2. Timing Test		Review Test Results	_____	_____
3. Digital Low R Ohmmeter		Review Test Results	_____	_____
4. Doble Test		Review Test Results	_____	_____
5. CT Ration & Polarity		Review Test Results	_____	_____
6. Breaker Alarms		Detailed Inspection	_____	_____
4. Circuit Switcher				
a. ___kV Circuit Switcher *Device Number* _____				
1. Hipot Test		Review Test Results	_____	_____
2. Timing Test		Review Test Results	_____	_____
3. Digital Low R Ohmmeter		Review Test Results	_____	_____
1. Fuses				
a. ___ kV Fuses *Device number* _____				
1. Rating/Type		Visual Inspection	_____	_____
2. Air Flow Test		Review Test Results	_____	_____

6. Power Transformer

a. ___kV Transformer *Device Number* _____

1. CT Ratio & Polarity Review Test Results _____ _____
2. Doble Tests Review Test Results _____ _____
3. TTR Tests (all Taps) Review Test Results _____ _____
4. Megger Tests Review Test Results _____ _____
5. Oil and DGA Tests Review Test Results _____ _____

7. CCVT/VT

a. ___kV *Circuit/Line Name* _____ *Device Number* _____

1. Doble Test Review Test Results _____ _____
2. Potential Polarizing Test Review Test Results _____ _____
3. Ration & Polarity Test Review Test Results _____ _____

b. ___kV CCVT/VT *Device Number* _____

1. Doble Test Review Test Results _____ _____
2. Potential Polarizing Test Review Test Results _____ _____
3. Ratio & Polarizing Test Review Test Results _____ _____

8. Phasing

a. _____ kV BUS *Number* _____

9. Batteries and Charger

a. _____V DC Battery and Charger

1. Battery Acceptable Review Test Results _____ _____
2. Intercall Resistance Test Review Test Results _____ _____
3. Charger Settings Review Test Results _____ _____
4. Ground Detector Review Test Results _____ _____

10. SCADA

a. Function Test with Dispatch/Control Center

1. Control Detailed Inspection _____ _____
2. Indication Detailed Inspection _____ _____

3. Alarms	Detailed Inspection	_____	_____
b. Metering	Detailed Inspection	_____	_____
c. Telemetering			
1. Signal Levels	Review Test Results	_____	_____
2. Calibrations	Review Test Results	_____	_____

11. Relay and control Schematics

a. _____kV Circuit Breaker *Device Number* _____

1. Correct Settings Applied	Review Test Results	_____	_____
2. Calibration Test	Review Test Results	_____	_____
3. Trip Test	Detailed Inspection	_____	_____
4. In-Service Load Angles	Detailed Inspection	_____	_____
5. Remote Relay Communication	Detailed Inspection	_____	_____

b. Annunicators and Alarms

1. Set Undervoltage & Time Delay Relays	Review Test Results	_____	_____
2. Function Tested	Review Test Results	_____	_____

12. Miscellaneous

a. Arresters

1. Sized Correctly	Visual Inspection	_____	_____
2. Located Properly	Visual Inspection	_____	_____

b. Clearance

1. Bus to Ground	Visual Inspection	_____	_____
2. Bus to Bus	Visual Inspection	_____	_____
3. Bus to Steel	Visual Inspection	_____	_____

c. Conductors

1. Sized Adequately	Visual Inspection	_____	_____
2. Connected Properly	Visual Inspection	_____	_____