

**FACILITY CONNECTION REQUIREMENTS  
FOR  
MERCED IRRIGATION DISTRICT**

**June 11, 2010**

**NERC Standard FAC-001-0**

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## **1.0 INTRODUCTION**

### **The District**

The Merced Irrigation District (District, MeID) is an irrigation district duly organized and existing under the Irrigation District Law (codified as Division 11 of the California Water Code) (the “Law”). The District has the powers under the Law to, among other things, provide irrigation and electric service.

The District was organized in December 1919, under the provisions of the Law. The District was created to provide water to the farms in the central portion of the San Joaquin Valley centered around the City of Merced. Currently, in addition to providing irrigation and electric distribution, the District also owns and operates the New Exchequer and McSwain dams, reservoirs, hydroelectric generation facilities and recreation facilities.

The MERCED IRRIGATION DISTRICT (MeID) Facility Connection Requirements have been developed and implemented to comply with the North American Electric Reliability Corporation (NERC) Standard FAC-001-0 – Facility Connection Requirements. These requirements are to ensure compliance with NERC Reliability Standards and applicable Western Electricity Coordinating Council (WECC), subregional, Power Pool, MeID planning criteria and facility interconnection requirements. MeID’s interconnection requirements address Generation facilities, Transmission facilities, and transmission level End-user facilities. These requirements are considered to be the minimum requirements to be used by MeID as a guide in accommodating interconnection requests. There may be additional requirements depending on the location and characteristics of the proposed interconnection facility and those requirements will be addressed on a case by case basis.

Any entity seeking to interconnect Generation, Transmission, and/or transmission level End-user facilities to the MeID electric system shall provide a written summary of its plans to MeID in order to achieve the required system performance, as described below, throughout the planning horizon.

## **2.0 INTERCONNECTION REQUIREMENTS FOR GENERATION, TRANSMISSION, AND TRANSMISSION LEVEL END-USER FACILITIES**

All requests for interconnection to the MeID transmission system must be consistent with NERC, WECC, sub-regional, Power Pool, and MeID reliability requirements, including standard utility practices. A proposed interconnection for Generation, Transmission, or transmission level End-user facilities must not degrade the reliability or operating

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flexibility of either the existing MeID transmission system or the existing BES. System Impact Studies are required to evaluate the impact of the requested facility interconnection on both the MeID transmission system and the BES. After acceptable completion of the System Impact Studies, a Facilities Study will be required to determine the detailed facility interconnection requirements. The Facilities Study will address the work and equipment required to provide for a safe and reliable physical interconnection between the facilities of the applicant and MeID.

All arrangements for system studies, engineering design, construction, ownership, operations, maintenance, replacement equipment, metering, facility controls, and telecommunications must be set forth in written contracts between MeID and the requesting party, including at a minimum an initial Letter of Agreement. If additional equipment and/or replacement equipment is required to accommodate the facility interconnection, MeID will end up with equivalent transmission capacity and operational control as previously existed on its transmission facilities. The costs associated with all studies and associated equipment additions and/or modifications shall be the responsibility of the requesting party, unless specifically agreed to in writing by the Parties. MeID reserves the right to participate in the costs of any proposed facility expansion plans that may be accommodated through mutually advantageous alternatives which provide substantial benefits to regional reliability or transmission transfer capability.

The requesting party will generally be responsible for obtaining any necessary right-of-ways or easements from landowners associated with their system facilities. All costs associated with environmental activities for the new facility will be the responsibility of the requesting party. Advance funds or deposits, as set out in the initial Letter of Agreement, will be required by MeID prior to any work being performed by MeID on behalf of the requesting party.

A direct interconnection into MeID's transmission system does not guarantee transmission capacity on or through the MeID transmission system. Transmission service requests must be made. Dues to the size and configuration of the MeID transmission system MeID does not believe that it will receive requests for transmission service, as such it has not filed an Open Access Transmission Tariff (OATT) with the FERC. At such time that it become necessary MeID will file an OATT with the FERC and will post the requirements to become a transmission customer on the Open Access Same-Time Information System (OASIS) and MeID's website at <http://www.mercedid.org/>.

Attachment 1 of this document provides a detailed listing of all of the data requirements associated with a valid Generator Interconnection Request.

The following requirements and procedures must be satisfied by any entity seeking to connect Generation, Transmission, and/or transmission level End-user facilities to the MeID electric system.

## **2.1. Procedures for Coordinated Joint Studies**

- 2.1.1. Entities seeking to connect Generation, Transmission, or transmission level End-user facilities shall work cooperatively with MeID in conducting Joint Studies of the new facilities and their impacts on the interconnected transmission system. By mutual agreement in writing the Parties may agree to have one party of the other perform the joint studies on their mutual behalf.
- 2.1.2. All costs to conduct or review System Impact studies are the responsibility of the requesting party, unless otherwise agreed in writing.
- 2.1.3. Studies evaluating the impacts of new or modified Generation, Transmission, or transmission level End-user facilities shall be conducted utilizing analytical tools and databases approved or deemed acceptable by MeID, which would include any analytical tools or databases utilized by WECC or considered acceptable by WECC.
- 2.1.4. The scope of studies to be conducted shall include but not be limited to power flow analysis, post-transient analysis, dynamic stability analysis, and short-circuit analysis to ensure compliance with all applicable NERC, WECC, subregional, Power Pool, and MeID standards, and requirements. Such study scope shall be as mutually agreed upon by MeID and the entity seeking to connect Generation, Transmission, or transmission level End-user facilities.
- 2.1.5. Evaluation of alternatives to the proposed facility connection, such as lower voltage construction, alternative interconnection points, reactive support facilities, or upgraded facilities, may be requested and shall be included in the System Impact studies at the requesting party's expense.
- 2.1.6. Power flow analysis will require 10-year load and resource projections and the planned facilities needed to satisfy all pre-existing long term transmission service requirements on the MeID transmission system. If the

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studies indicate that additions or upgrades to the existing MeID transmission system are necessary, MeID will conduct or review facilities studies, at the expense of the requesting entity, to determine the cost of additions or upgrades and the required timeframe for implementing system additions or upgrades.

- 2.1.7. The transmission planning process for a proposed new facility connection must also accommodate coordinated joint studies with other affected interconnected transmission system owners.
- 2.1.8. The requestor shall provide the following detailed information for use in the transmission planning studies:
  - 2.1.8.1. Facility one-line diagram depicting detailed proposed facility connection points, voltage levels, equipment data, breaker/switch configurations, and protective relay schemes.
  - 2.1.8.2. Transformer impedance data, winding configurations, voltage levels, thermal ratings, and available tap ranges.
  - 2.1.8.3. Generator nameplate data and machine constants, generator voltage rating, step-up, and auxiliary transformer data, impedance data, and ratings.
  - 2.1.8.4. Generator rotor, governor, exciter, power system stabilizer and any other generator auxiliary data in accordance with WECC generator data specifications.
  - 2.1.8.5. Generator MW/MVAR levels, reactive capability curves, operational power factors and proposed load factors.
  - 2.1.8.6. Transmission line configuration, impedance, and thermal ratings.
- 2.1.9. The System Impact and Facilities studies shall typically be performed in multiple sequential stages. Phase 1 of the System Impact study or Feasibility study shall address a first level power flow screening analysis of the proposed interconnection facility. Phase 2 of the System Impact study shall address a much more detailed power flow analysis, post-transient analysis, dynamic stability analysis, short circuit analysis, and any other

required study work. Phase 3 (Facilities study) will detail the final interconnection facilities design, direct assignment facilities, costs and construction schedule estimates. The Facilities study will merge the results of the System Impact studies into a final Planning/Design study. An Interconnection Agreement will not be executed until all of these steps have been successfully completed. The entity seeking to connect Generation, Transmission, or transmission level End-user facilities will have the option to rescind the interconnection request following the completion of any of the study phases.

- 2.1.10. Results of coordinated joint studies shall be documented along with any conclusions and recommendations. Such documentation shall be retained by MeID and shall be made available if requested by NERC, WECC, or any other entities responsible for the reliability of the interconnected transmission system, as soon as feasible.

## **2.2. Procedures for Notification of New or Modified Facilities**

- 2.2.1. Notification of new or modified facilities shall be emailed to WECC, the Regional Reliability Coordinator, as soon as feasible at [rrequesteddocuments@wecc.biz](mailto:rrequesteddocuments@wecc.biz).

## **2.3. Voltage Level and MW and MVAR Capacity or Demand at Point of Connection**

- 2.3.1. The requestor for a proposed facility shall specify the requested voltage level and MW/MVAR capacity and/or demand at the point of connection. Also any special operational considerations or constraints shall be specified by the requestor. This information will be utilized to develop computer models of the requested facility for input into the transmission planning studies. Costs associated with any specialized modeling development requirements are the responsibility of the requestor.

## **2.4. Transmission Taps**

- 2.4.1. Proposed taps to MEID's transmission circuits are subject to approval on a case-by-case basis and may require the construction of an interconnection substation with associated equipment. As a general principle MEID does not encourage the use of MeID-span transmission taps.

Taps on the 115 kV transmission system shall meet the following minimum



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criteria:

- 2.4.1.1. A line section protected by circuit breakers may have a mileage maximum for tap lines that are not protected by circuit breakers, determined on a case-by-case basis.
- 2.4.1.2. A proposed interconnection to a transmission line, whenever possible, will be connected to the line at an existing tap.
- 2.4.1.3. No more than one connection, without line sectionalizing capability, will be permitted between 115 kV transmission line breakers.
- 2.4.1.5. SCADA-controlled interrupter switches (or equivalent) capable of interrupting load and charging current shall be installed in the line sectionalizing positions for all tap substations. These interrupters will be used to de-energize line sections without interruption of the tapped loads, if necessary. Line sectionalizing switches installed in transmission lines shall be furnished with grounding blades, and must have a visible air gap. Normally, MEID assumes ownership of the sectionalizing switches. If MEID does not assume ownership, however, MEID will still maintain operational control.
- 2.4.1.6. An ungrounded high voltage winding is the preferred transformer connection on the tapped line, however, no more than one grounded transformer will be permitted on a 115 kV transmission line.

Entities requesting non-MEID designed transmission line taps shall submit designs, calculations, and drawings demonstrating that the structures and foundations have been designed in accordance with MEID's Standard Design Criteria. Taps to transmission lines with insulated Overhead Ground Wires (OHGWs) shall not degrade the capability of the existing OHGW.

## **2.5. Substations**

- 2.5.1. Generally, power circuit breakers must be installed at all interconnections with MEID's system. Typical specifications covering circuit breaker requirements are available from MEID upon request.

Installation of equipment in substations shall conform to MEID's requirements and Standards and shall be approved by MEID. All Oil-filled equipment, including bushings, shall not contain polychlorinated biphenyls (PCB's). In addition, oil-filled equipment shall be permanently labeled by the manufacturer as non-PCB. Certification shall be provided to MEID at or

before the time of installation. Oil-filled equipment may require an oil spill containment system to comply with U.S. Environmental Protection Agency or state regulations. Any increased equipment costs due to these requirements shall be borne by the requesting entity.

## **2.6. Breaker Duty and Surge Protection**

2.6.1. With respect to the connection of Generation, Transmission, or transmission level End-user facilities, MeID shall review breaker duty and surge protection to identify any additions required to maintain an acceptable level of MeID system availability, reliability, equipment insulation margins, and safety. Any costs associated with such additions shall be the responsibility of the requesting entity.

## **2.7 System Protection and Coordination**

2.7.1. MeID's system protection requirements are designed and intended to protect the MeID system from equipment damage, to ensure the safety of the general public, MeID, and other utility personnel, to minimize adverse operating conditions affecting MeID and its customers, and to comply with NERC, WECC, Turlock Irrigation District (TID), and MeID protection criteria in existence, and to promote reliable system operation. If additional protective relays are required to protect the Generation, Transmission, and transmission level End-user facilities of entities requesting connection of such facilities to the MeID system it is the requestor's responsibility to install and coordinate the proper protective relaying. MeID does not assume responsibility for protection of the interconnected facilities. The requestor is solely responsible for System Protection and Coordination of protection systems of its interconnection equipment so that faults, imbalances or other disturbances on the requestor's system do not cause damage to the facilities on the MeID system.

To meet the reliability requirements of NERC and WECC, under-frequency and/or under-voltage load shedding schemes may be required. Any load or reactive device connected to the MeID system will be expected to participate in under-frequency or under-voltage load-shedding programs if MeID determines such action is necessary to maintain system reliability. If MeID requires load-shedding participation for a particular transmission level End-user facility, the requestor shall be responsible for all related costs.

## **2.8. Metering and Telecommunications**

2.8.1. Current transformers used for revenue metering circuits must meet the accuracy standards, as specified under ANSI C57.13, for an accuracy class of 0.3 percent at all burdens. The thermal current rating of current transformers shall exceed the maximum current capacity of the circuit involved by a factor of 1.5 to 2.0. Voltage transformers used for revenue metering circuits must meet the accuracy standards, as specified under ANSI C57.13, of 0.3 percent accuracy with the following burdens:

- (1) “W” through “Y” burden for 25-kV and below
- (2) “W” through “ZZ” burden for above 25-kV.

Revenue metering with mass memory storage shall be used if the estimated maximum demand is 500 KVA or greater, or if maximum simultaneous demand billing is contractually required. Such revenue metering shall be compatible with the metering policy established by MeID.

The requesting entity shall provide telecommunications facilities sufficient to meet MeID’s telephone, radio, system protection, remote meter reading and EMS/SCADA requirements. The communication channel and channel hardware will be provided by the requesting entity. MeID will specify the type, speed, and characteristics of the communication channel equipment so that compatibility with existing communications, supervisory control, relaying and telemetering equipment is maintained. The specific type of communication equipment to be furnished by the requesting entity will be reviewed and approved by MeID. The requesting entity will reimburse MeID for the costs of any additional facilities provided by MeID.

Fiber optic additions to new or existing MeID transmission lines will be considered on a case-by-case basis. Technical analysis of clearances, structural loads, and electrical field effects may limit applications. Outage restrictions and maintenance responsibilities may also impact potential paths. MeID reserves the right to charge a fee for ROW, pole attachments and/or acquire individual optical fibers on the circuit, per agreement between the interconnecting entity and MeID.

## **2.9. Grounding and Safety Issues**

- 2.9.1. Modifications to the ground grids of existing substations may be necessary to keep ground grid voltage rises within safe levels. The ground grid should be designed to ANSI/IEEE Standard 80-1986, IEEE Guide for Safety in AC Substation Grounding.

Equipment must be operated and maintained in accordance with manufacturer's recommendations, prudent utility practices, and applicable environmental and safety standards. MeID may require additional equipment to ensure a reliable interconnection and to safeguard the proper operating conditions of its power system. MeID prefers, in many cases, to provide required O&M services provided funds have been advanced to cover these costs. Costs may include training on maintenance procedures for unfamiliar equipment.

The interconnection substation must have a ground grid that solidly grounds all metallic structures and other non-energized metallic equipment. This grid shall limit the ground potential gradients to such voltage and current levels that will not endanger the safety of people or damage equipment located in, or immediately adjacent to, the station under normal and fault conditions.

MeID personnel will conduct an inspection of the new substation and associated interconnection facilities prior to the energization of these facilities. The inspection requirements will be consistent with the inspection requirements of existing substation facilities. Only after a satisfactory inspection is completed will the new substation interconnection facilities be authorized for energization and synchronization.

The new interconnection facilities will be energized and tested for 48 hours prior to paralleling with the MeID facilities, unless otherwise agreed in writing by the Parties.

## **2.10. Insulation and Insulation Coordination**

- 2.10.1. System impact and/or Facilities studies shall include the evaluation of the impact of the new or modified facility on equipment insulation and insulation coordination.

A transmission line switching study may be required to evaluate transient overvoltages caused by switching operations involving the proposed new

interconnection facility at MeID's discretion, in order to determine the Basic Insulation Level (BIL) requirements and/or breaker closing resistor requirements for the proposed new facilities.

## **2.11. Voltage, Reactive Power, and Power Factor Control**

- 2.11.1. The power factor for both Generation and transmission level End-user facilities shall be measured at the interconnection point.

Synchronous generators shall produce or absorb reactive power between .95 leading and .95 lagging power factors for steady state conditions to support voltage schedules. Interconnected generators shall have the capability to produce or absorb reactive power up to the thermal capability of the generator during transmission system disturbances. The voltage regulator shall be capable of maintaining the voltage at the generator terminal bus without hunting and within 0.5 percent of any set-point. The operating range of the regulator shall be at least plus or minus 5 percent of the rated voltage of the generator. The excitation system of synchronous generators shall be of a fast-response or High Initial Response type (the voltage response time is 0.5 seconds or less).

Wind turbines or other induction type generators without VAR control capability will absorb VARs from the transmission system and therefore require reactive power support from the requestor's or MeID's system. For proposed wind induction type generator interconnections, MeID will require power factor correction at a minimum. Power factor correction capacitors must be installed either by the owner of the generation or by MeID at the owner's expense. Switched capacitor banks supplied by the generation owner shall be coordinated with MeID voltage control requirements and switched at the request of MeID. Owners of interconnected induction generators shall provide, at a minimum, sufficient reactive power capability to deliver the generator output at unity power factor at the point of interconnection. Dynamic reactive compensation through turbine based or substation based systems are also acceptable methods to provide voltage control at the point of interconnection. Dynamic reactive power compensation may also be required in addition to static power factor compensation at some locations. The System Impact Study will determine the reactive compensation required for the wind turbine generator interconnection. Induction generators are usually not required to participate in voltage regulation; however, they must not

adversely affect voltage schedules. Integration studies may be necessary to determine the reactive power capability necessary to ensure that these schedules are maintained.

Power system disturbances initiated by faults and forced equipment outages expose connected generators to voltage and frequency oscillations. It is important that generators remain in service to help ensure that any dynamic or transient oscillations are stable and well damped. Therefore, each generator must be capable of continuous operation at 0.95 to 1.05 per unit voltage and frequency ranges as defined by WECC in the WECC Coordinated Off-Nominal Frequency Load Shedding and Restoration Plan. Over/under voltage and over/under frequency relays are normally installed to protect the generators from extended off-nominal voltage/frequency operations. To ensure that the interconnected generators do not trip prematurely, the time delays for these relays must be coordinated with MeID's system protection schemes.

A speed governor system is required on all synchronous generators. The governor regulates the output of the generator as a function of the system frequency. That function (called the governor's "droop" characteristic) must be coordinated with the governors of other generating units located within the CAISO Balancing Authority Area to ensure proper system response to frequency variations.

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

MeID maintains transmission voltages at levels required for the reliable delivery of power to its customers and to maintain the stability of its transmission system. Regulation to keep voltage variations within limits acceptable to end-use customers is typically provided on the MeID distribution system. Voltage regulation at transmission voltage levels is different from distribution voltage levels. MeID typically maintains transmission voltage levels between 0.95 – 1.05 Per Unit during normal conditions and between 0.90 – 1.10 Per Unit during emergency conditions. Owners of transmission level End-user facilities are strongly urged to install their own voltage regulation equipment and coordinate any voltage

set points or time delays with the normal transmission voltage bandwidths.

## **2.12. Power Quality Impacts**

- 2.12.1. Unbalanced phase voltages and currents can affect protective relay coordination and cause high neutral currents and thermal overloading of transformers. To protect MeID and its customers' equipment, the interconnected facility contribution at the point of interconnection shall not cause a voltage unbalance greater than 1 percent or a current unbalance greater than 5 percent. Phase unbalance is the percent deviation of one phase from the average of all three phases.

Harmonics can cause telecommunication interference, thermal heating in transformers, disruptions to solid state equipment and resonant over-voltages. To protect equipment from damage, harmonics must be managed and mitigated. The interconnected generator/load shall not cause voltage and current harmonics on the MeID system that exceed the limits specified in Institute of Electrical and Electronics Engineers (IEEE) Standard 519. Harmonic distortion is defined as the ratio of the root mean square (rms) value of the harmonic to the rms value of the fundamental voltage or current. Single frequency and total harmonic distortion measurements may be conducted at the point of interconnection, generation/load site or other locations on MeID's system to determine whether or not the interconnection project is the source of excessive harmonics.

Many methods may be used to restrict harmonics. The preferred method is to install a transformer with at least one delta connection between the generator/load and the MeID system. This method significantly limits the amount of voltage and current harmonics entering the MeID system.

Voltage fluctuations may be noticeable as visual lighting variations (flicker) and can damage or disrupt the operation of electronic equipment. IEEE Standard 519 provides definitions and limits on acceptable levels of voltage fluctuation. All generators/loads connecting to the MeID system shall comply with the limits set by this Standard.

All transmission level End-user facilities connected to the MeID system shall meet the power quality standards set forth above. The entity seeking to connect to the MeID system is responsible for any mitigation efforts necessary to meet those standards.

Electro-magnetic Transients Program (EMTP) studies may be required to analyze the power quality impacts of a proposed facility.

### **2.13. Equipment Ratings**

2.13.1. With respect to the connection of Generation, Transmission, or transmission level End-user facilities, the requesting entity is responsible for ensuring that the facilities shall not result in any violation of MeID equipment ratings. In addition, the requesting entity is responsible for ensuring that the interconnection facility is designed and operated to adhere to equipment ratings. Any costs associated with adhering to equipment ratings with respect to the new or modified facility shall be the responsibility of the requesting entity.

### **2.14. Synchronizing of Facilities**

2.14.1. Automatic synchronization shall be supervised by a synchronizing check relay IEEE Device 25. This assures that no synchronous generator is connected to the power system out of synchronization. Generators must meet all applicable NERC, WECC, and American National Standards Institute (ANSI) and IEEE standards. The prime mover and the generator shall also be able to operate within the full range of voltage and frequency excursions that may exist on the MeID system without damage to them.

Following the execution of an Interconnection and Operating Agreement and the successful completion of all construction, inspection and facility checkout and testing procedures, the interconnected facility will be released for energization. The initial parallel or synchronization will be supervised and coordinated with MeID transmission operating personnel as appropriate. Future parallel or synchronization will be controlled by the appropriate TID Transmission System Control (TSC) personnel and will either be automatic or manual per the direction of MeID or TID.

### **2.15. Maintenance Coordination**

2.15.1. The owner of installed equipment shall be responsible for its proper operation and maintenance. Equipment must be operated and maintained in accordance with manufacturer's recommendations, prudent utility practices, and applicable environmental and safety standards. The facility owner shall coordinate maintenance with MeID. MeID may require



additional equipment to ensure a reliable interconnection and to safeguard the proper operating conditions of its power system.

Maintenance will normally be performed by and at the expense of the entity that owns the equipment or facility when the proposed interconnection involves a tap or substation sectionalizing one of MeID's transmission lines. MeID shall be notified and have the right to witness settings and testing of relays, meters, and controls that could affect the integrity and security of MeID's transmission system. MeID shall also have the right to enter interconnected facilities for emergency operation and maintenance of equipment or structures MeID deems necessary to maintain a reliable power system.

MeID may require, in some cases, to provide required O&M services on the new interconnection facilities provided funds have been advanced to cover these costs. Costs may include training on maintenance procedures for unfamiliar equipment.

## **2.16. Operational Issues (abnormal frequency and voltages)**

2.16.1. The facility connection studies shall identify impacts, deficiencies, operational issues (including abnormal frequency and voltages), or interconnection facility concerns and evaluate potential solutions. A proposed facility connection must not degrade the reliability or operating flexibility of the existing BES. The proposed facility connection shall comply with all NERC, WECC, TID, and MeID standards.

## **2.17. Inspection Requirements for Existing or New Facilities**

2.17.1. Protective relays and control systems must be inspected and tested by functional trip checking prior to putting any interconnected facility in service. The future maintenance and testing shall be in accordance with MeID's Protective Relaying & Maintenance Procedures. MeID personnel will need to be involved with procedures prior to and during any future maintenance and testing of protective relaying devices. The requesting entity is responsible for the costs associated with the ongoing testing and maintenance of the protective relaying and control equipment.

MeID personnel will conduct an inspection of all new substation interconnection facilities prior to the energization of these facilities. The

inspection requirements will be consistent with the inspection requirements of existing substation facilities. Only after a satisfactory inspection is completed will the new substation interconnection facilities be authorized for energization and synchronization.

## **2.18. Communications and Procedures During Normal and Emergency Operating Conditions**

2.18.1. All communications and operating procedures during normal and emergency operating conditions (abnormal frequency and voltages for example) will be initiated and controlled by TID (Transmission Control Center (TSC) personnel. Any requests from the interconnected facility for any special operating considerations will be submitted to TID TSC for review and approval prior to execution. Emergency operating conditions will be handled in accordance with NERC and WECC Standards and good utility practice. The interconnection facility must recognize the dynamic nature of an interconnected transmission system and the reliability and safety priorities of the TID TSC. TID TSC personnel may not be available immediately during all emergency conditions and the TID TCS will communicate system status and any special operating restrictions to the interconnected facility as soon as feasible.

Circuit breakers, disconnects, interrupters and motor-operated disconnect switches that are an integral part of MeID's transmission system shall be operated and dispatched by TID TSC. The TID Transmission System Control Center will direct switching and issue all clearances, hot-line orders, and general switching on the transmission portion of the interconnection or substation. This will involve use of approved TID switching and clearance procedures, including use of TID locks and tags.

The requesting entity making the interconnection will write Standard Operating Procedures in coordination with MeID, TID for the interconnected facility. Three sets of instructions and manufacturer's drawings shall be furnished to MeID for each piece of equipment that MeID operates.

If construction activities are performed by other entities, MeID may require at least one MeID representative be present to coordinate and provide for switching, clearances, special work permits, and inspections during construction work on MeID's right-of-way. The MeID representative will

also conduct operability checkout on equipment, including metering, relay settings and tests and protective device operation (circuit breakers, motor-operated disconnects, etc.). Final electrical connections to MeID's system will be made by MeID or under MeID's supervision.

### **3.0 ENGINEERING**

MeID will provide for engineering design, specification, and construction of the proposed interconnection facilities to MeID owned, operated, and maintained facilities at the expense of the requesting entity. Non-MeID engineering design may be allowed provided it receives initial approval and subsequent review by MeID engineering staff. All engineering costs and engineering review costs are the responsibility of the requesting party. For transmission line taps owned by others, prints of applicable facility drawings shall be furnished by MeID upon request.

All work performed by MeID will include revisions to existing MeID drawings at the expense of the requesting entity.

If the interconnection facilities are to be owned by MeID, then any new land rights necessary for the interconnection may be acquired by MeID from the affected landowners, at the expense of the requesting entity. In certain circumstances, the requesting entity may acquire these additional land rights, provided they coordinate with MeID as to what rights are necessary.

Modifications to MeID's transmission system to accommodate the proposed interconnection shall adhere to MeID's Standard Design Criteria. Any variation from the Standard Design Criteria may be considered on a case-by-case basis. MeID's Standard Design Criteria will be furnished after the initial Letter of Agreement is signed.

Drawings for facility additions must conform to MeID's Drafting Standards and be approved by MeID. The requesting entity will supply drawings via an electronic file or other common storage device, compatible with MeID's computer-aided design system, AutoCAD. The requesting entity shall reimburse MeID for drawing costs. Copies of MeID's Drafting Standards shall be furnished to the entity requesting the interconnection if the design is not produced by MeID. "As-built" drawings must be provided prior to final approval by MeID. Three complete sets of accurate substation drawings shall be provided to MeID for non-MeID-owned substations. These drawings shall include, but not be limited to, station plot plans, equipment layouts, single-line diagrams, control circuit schematics, and wiring diagrams. Updated copies of these drawings shall be furnished to MeID within 60 days of any modification to non-MeID owned equipment or substations on MeID's system.

Breakers and switches installed in MeID substations shall adhere to MeID numbering schemes. Breaker and switch operation numbers will be assigned by MeID. All switches

to be operated by MeID will be locked with locks furnished by MeID. All switches to be operated by MeID shall be designed in accordance with MeID’s Standard Design Criteria.

**4.0 MAINTENANCE AND UPDATING OF MeID’S FACILITY CONNECTION REQUIREMENTS**

MeID shall maintain and update its facility connection requirements as required. MeID shall make its facility connection requirements documentation available to the users of the transmission system, WECC, and NERC on request (five business days). The Manager of Engineering & Operations Electric Resources, 744 West 20th Street (95340), PO Box 2288, Merced, CA 95344, Office 209-722-5761, will be responsible for maintaining these facility connection requirements and making documentation of the requirements available to requesting entities within ten business days.

**5.0 VERSION HISTORY**

**Documentation Control:**

**Change History:**

*The change history below reflects changes to the document or its structure.*

<b>Version</b>	<b>Description of change</b>	<b>Action</b>	<b>Date</b>
0	New	Draft	January 10 <sup>th</sup> , 2009
1.0	Add History, minor edits	Effective Date	February, 4 <sup>th</sup> , 2009
1.1	Delete CMRC, title change	Edits	June 11, 2010

**Review Log:**

*This document shall be reviewed annually.*

<b>Reviewed By</b>	<b>Title</b>	<b>Date</b>

**Attachment 1**

**MeID Generator Interconnection**

**Data Request Form**

*Requestor: Organization:* \_\_\_\_\_

*Contact:* \_\_\_\_\_

*Address:* \_\_\_\_\_

\_\_\_\_\_

*Phone:* \_\_\_\_\_

*E-Mail:* \_\_\_\_\_

***Interconnection Site Information:***

\_\_\_\_\_ *Proposed New Generation Facility*

\_\_\_\_\_ *Increased Capacity At An Existing Generation Site*

*Physical Location Site Description (County, City, Address, etc.):*

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

*Electrical Location Site Description (Point of Interconnection):*

\_\_\_\_\_  
\_\_\_\_\_

*Attached One-Line Diagram? (Y/N)* \_\_\_\_\_

**Generator General Information:**

Fuel Type (Coal, Diesel, Wind, etc.): \_\_\_\_\_

Maximum Total Generation Capacity (MW): \_\_\_\_\_

Number of Generating Units: \_\_\_\_\_

Generator Type (Synchronous / Induction): \_\_\_\_\_

Expected Commercial In-Service Date: \_\_\_\_\_

Expected Initial Synchronization Date: \_\_\_\_\_

**Generator Nameplate Ratings:**

Manufacturer: \_\_\_\_\_ Model: \_\_\_\_\_

Machine MVA: \_\_\_\_\_ Power Factor: \_\_\_\_\_

Terminal Voltage (kV): \_\_\_\_\_ Machine Speed (RPM): \_\_\_\_\_

Frequency (Hz): \_\_\_\_\_ Short Circuit Ratio: \_\_\_\_\_

**Generator Modeling Data:**

**Reactance Data (Per-Unit Machine MVA Base)**

**Direct Axis Quadrature Axis**

Synchronous – saturated  $X_{dv}$  \_\_\_\_\_  $X_{qv}$  \_\_\_\_\_

Synchronous – unsaturated  $X_{di}$  \_\_\_\_\_  $X_{qi}$  \_\_\_\_\_

Transient – saturated  $X'_{dv}$  \_\_\_\_\_  $X'_{qv}$  \_\_\_\_\_

Transient – unsaturated  $X'_{di}$  \_\_\_\_\_  $X'_{qi}$  \_\_\_\_\_

Subtransient – saturated  $X''_{dv}$  \_\_\_\_\_  $X''_{qv}$  \_\_\_\_\_

Subtransient – unsaturated  $X''_{di}$  \_\_\_\_\_  $X''_{qi}$  \_\_\_\_\_

Negative Sequence – saturated  $X_{2v}$  \_\_\_\_\_

Negative Sequence – unsaturated  $X_{2i}$  \_\_\_\_\_

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*Zero Sequence – saturated  $X0v$  \_\_\_\_\_*

*Zero Sequence – unsaturated  $X0i$  \_\_\_\_\_*

*Leakage Reactance  $Xlm$  \_\_\_\_\_*

***Time Constant Data (Sec)***

*Open Circuit Subtransient  $T''do$  \_\_\_\_\_  $T''qo$  \_\_\_\_\_*

*3-Ph Short Circuit Armature  $Ta$  \_\_\_\_\_*

***Armature Winding Resistance***

*Positive  $R1$  \_\_\_\_\_ Negative  $R2$  \_\_\_\_\_ Zero  $R0$  \_\_\_\_\_*

***Total Inertia (Generator + Turbine)***

*Inertia Constant  $H$  \_\_\_\_\_ MW-sec/MVA (On Machine MVA Base)*

***Generator Characteristic Curves***

***Generator Reactive Capability Curves Attached? (Y/N) \_\_\_\_\_***

***Generator Vee Curves Attached? (Y/N) \_\_\_\_\_***

***Generator Saturation Curves Attached? (Y/N) \_\_\_\_\_***

***Excitation System Data***

*Identify appropriate IEEE model block diagram or GE PSLF Power System Simulator Model of the excitation control system and power system stabilizer. The corresponding constant data is required for computer representation in power system stability simulations.*

***Governor System Data***

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*Identify appropriate IEEE model block diagram or GE PSLF Power System Simulator Model of the governor system. The corresponding governor system constant data is required for computer representation in power system stability simulations.*

*Note: If actual generator data is not available, MeID will work with the customer to develop representative modeling data for use in the System Impact Study. Once the facility is constructed and tested, the models must be updated with actual data and the complete data and test results must be provided to MeID.*

**Wind Generator Data**

*Number of Wind Turbines to be connected at the Point of Interconnection \_\_\_\_\_*

*Type of Induction Generating Unit \_\_\_\_\_*

*Manufacturer \_\_\_\_\_*

*Nameplate Rated MVA \_\_\_\_\_*

*Unit Maximum Output (MW) \_\_\_\_\_*

*Power Factor Control Characteristics \_\_\_\_\_*

*Voltage Control Characteristics \_\_\_\_\_*

*Note: Detailed dynamic modeling data for the specified wind turbines is required for computer representation in power system stability simulations. This includes data required to develop a detailed generator/converter model, electrical control model, turbine and turbine control model. The data is required in compatible IEEE or GE PSLF format.*

**Generator Step-up (GSU) Transformer Data**

*Generator Step-up Transformer MVA Base \_\_\_\_\_*

*Generator Step-up Transformer Rating(s) (MVA) \_\_\_\_\_*

*GSU Transformer Voltage Ratings H\_\_\_\_\_ L\_\_\_\_\_ T\_\_\_\_\_*

*GSU Winding Connection (Wye/Delta) H\_\_\_\_\_ L\_\_\_\_\_ T\_\_\_\_\_*



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*Available Fixed Taps* \_\_\_\_\_

*Present Fixed Tap Setting* \_\_\_\_\_

*Generator Step-up Transformer Impedance*

*( $R+jX$  or %  $R$  & %  $X$  on transformer MVA Base)*

*Positive Sequence  $R X$  MVA Base*

*H-L* \_\_\_\_\_

*H-T* \_\_\_\_\_

*L-T* \_\_\_\_\_

*Zero Sequence T-Model*

Note: Following construction and testing, transformer test reports must be provided to MeID.