FACILITY CONNECTION REQUIREMENTS DOCUMENT

TECHNICAL REQUIREMENTS FOR INTERCONNECTION TO THE CITY OF ABBEVILLE, LA TRANSMISSION SYSTEM

Initial Issue
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1.0 Introduction

The City of Abbeville, Louisiana (Abbeville) is a body politic and political subdivision of the state of Louisiana. Abbeville currently owns and operates transmission and subtransmission facilities in a service territory roughly encompassing its incorporated limits.

Abbeville's transmission facilities are comprised solely of substation facilities energized at 138kV and operated as part of the interconnected electrical system.[1] The Abbeville transmission system is operated as a part of Entergy's interconnected electrical network and is located on the southern end of Entergy's system. Abbeville currently is a wholesale Customer of Cleco Power (Cleco) and is part of the Cleco Control Area. Finally, Abbeville is a member of the Southwest Power Pool (SPP) who is Abbeville's Regional Entity (RE).

Abbeville's subtransmission facilities are operated at 34.5kV and function as a looped power delivery system to provide power to four (4) 13.2kV and two (2) 4.16kV distribution substations.

2.0 Purpose

This document was developed to describe the general requirements for interconnection with the Abbeville transmission system. This document provides an overview of the technical and reliability requirements to address interconnection requests. The interconnections include facility additions and modifications to accommodate generation, transmission, and end-user facilities which are being connected to or planned to be connected to the Abbeville transmission system. These requirements were established to promote safe operation, system integrity, reliability, and compliance with NERC and regional reliability standards. These requirements are considered a minimum to be used as a guide toward processing of interconnection requests by Abbeville. There may be additional requirements depending on the location and characteristics of the proposed interconnection facility and those requirements will be evaluated on a case by case basis.

3.0 General Interconnection Requirements

All requests for interconnection to the Abbeville transmission system must be consistent with regional reliability requirements and good utility practices.[2] A proposed interconnection must not degrade the reliability or operating flexibility of the existing transmission system. Abbeville assumes responsibility to operate and maintain its

[1] SPP has recognized and accepted Entergy as the Transmission Operator for Abbeville's 138kV transmission facilities.

[2] Given the limited scope of Abbeville's transmission facilities, their direct interconnection to the Entergy transmission system and their potential to impact reliability of the Entergy transmission system, it is recommended all requests for interconnection be coordinated with both Abbeville and Entergy.

interconnected facilities in accordance with NERC and regional planning and operating standards. System Impact Studies are required to evaluate the impact of the requested interconnection and alternative plans to meet established reliability criteria. 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 direct assignment interconnection facilities, network upgrades, cost estimates, and construction scheduling estimates.

All arrangements for system studies, engineering design, construction, ownership, operations, maintenance, replacement equipment, metering, facility controls, and telecommunications must be set forth in written contracts between Abbeville and the requesting party.[3] If additional equipment or replacement equipment is required to accommodate the facility interconnection, Abbeville will retain equivalent transmission capacity and operational control as previously existed. The cost associated with equipment modifications is the responsibility of the requesting party. Abbeville reserves the right to participate in the costs of 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-way or easements from landowners. All costs associated with environmental activities for the new facility will be the responsibility of the requesting party. Advance funds or deposits will be required by Abbeville prior to any work being performed.

A direct interconnection into Abbeville's transmission system does not guarantee transmission capacity on the Abbeville or Entergy systems. Transmission service requests must be made in accordance with Southwest Power Pool's FERC Electric Tariff. The SPP Tariff and the requirements to become a transmission customer are posted on the Open Access Same-Time Information System (OASIS) and SPP's website at www.spp.org .

4.0 Reliability Requirements

4.1 Transmission Planning

The Transmission Planning process is an important first step in the determination of interconnection feasibility. The transmission planning studies will identify impacts, deficiencies, operational issues, or interconnection facility concerns and evaluate potential solutions. A proposed interconnection must not degrade the reliability or operating flexibility of the existing power system. The proposed interconnection must comply with all NERC Planning & Operating Standards. The proposed interconnection must also comply with all SPP Standards and Criteria. The proposed interconnection must be reviewed by all impacted transmission owners and approved by the SPP Transmission Working Group (TWG).

[3] As necessary, Entergy may also be party to all contracts and agreements referenced herein.

Abbeville will conduct or review System Impact Studies required to evaluate the system impact of a proposed interconnection on the reliability and capability of the transmission system. All costs to conduct or review System Impact Studies are the responsibility of the requesting party. The System Impact Studies will include, but are not limited to, powerflow, dynamic stability, and short circuit studies. Small Signal Stability Studies or Electro-magnetic Transients Program (EMTP) studies may also be required, if deemed necessary. Evaluation of alternatives to the proposed interconnection, such as lower voltage construction, alternative interconnection points, reactive support facilities, or upgraded facilities, may be requested. Powerflow analysis will require 10-year load and resource growth projections and the planned facilities needed to satisfy all pre-existing long term transmission service requirements. If the studies indicate that additions or upgrades to the existing transmission system are necessary, Abbeville 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.

The transmission planning process for a proposed new interconnection facility must also accommodate coordinated joint studies with other affected interconnected transmission system owners such as Entergy. Once a new facility is considered feasible for interconnection, the requestor shall notify the SPP Transmission Working Group (TWG).

The SPP TWG provides an appropriate technical forum of regional transmission providers who can review proposed facility plans and readily identify concerns, issues, and impacts. The regional transmission providers and requestors can work together to develop the most efficient transmission plan that will accommodate the proposed project and meet NERC reliability standards. Any transmission planning studies performed by either Abbeville or others will need to be reviewed and coordinated with the appropriate impacted parties.

The requestor shall provide the following detailed information for use in the transmission planning studies:

1. Facility one-line diagram depicting detailed proposed interconnection points, voltage levels, equipment data, breaker / switch configurations and protective relay zones.
2. Transformer impedance data, winding configurations, voltage levels, thermal ratings, and available tap ranges.
3. Generator nameplate data and machine constants, generator voltage rating, step-up and auxiliary transformer data, impedance data and ratings.
4. Generator rotor, governor, exciter, power system stabilizer and any other generator auxiliary data.
5. Generator MW / MVAR levels, reactive capability curves, operational power factors and proposed load factors.
6. Transmission line configuration, impedance and thermal ratings.

Attachment 1 of this Facility Connections Requirements Document provides a detailed

listing of all of the data requirements associated with a valid Generator interconnection request.

The requestor for a proposed facility shall specify the requested voltage level and MW / MVAR capacity and/or demand at the point of connection. For Generator Interconnection studies, the full nameplate capacity will be studied for injection at the requested location. All powerflow and stability studies will evaluate the impacts of the maximum capability of the requesting interconnection facility. Also the full approved capacity of other existing generators in the impacted region will be studied and maintained. Any special operational considerations or limitations associated with the interconnection facility 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. Any specialized modeling development requirements are the responsibility of the requestor.

The System Impact and Facilities Studies will typically be performed in multiple sequential stages. Phase 1 of the System Impact Study (Feasibility Study) will address a first level powerflow screening analysis of the proposed interconnection facility. Phase 2 of the System Impact Study will address a much more detailed powerflow 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 which will be formatted for submittal to the regional reliability authority. The Interconnection Agreement will be under the SPP Large Generator Interconnection Agreement (LGIA) process. The SPP LGIA process and standard interconnection agreement can be found at www.spp.org.

4.2 Generation Facilities

When Abbeville considers integrating a new generation facility interconnection into the Abbeville transmission system, additional special studies may be required based on the requested location of the proposed interconnection. Operational studies may also be required to evaluate impacts on present generation operations in the Cleco Control Area.

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 American National Standards Institute (ANSI) and IEEE standards. The prime mover and the generator should also be able to operate within the full range of voltage and frequency excursions that may exist on the Abbeville system without damage to them.

System voltage regulation is necessary for efficient and reliable electrical power delivery and for adequate service to loads. Voltage schedules establish hourly operating requirements and may be set for seasons, holidays, and days of the week or time of day. All interconnected synchronous generators are required to participate in voltage regulation by meeting voltage scheduling requirements. If dictated by planning studies, additional reactive capability or voltage regulation may be required to integrate the new

generation interconnections. It is the generator owner's responsibility to mitigate any unacceptable reactive or voltage regulation problems created due to the integration of the generator.

Synchronous generators are required to produce or absorb reactive power between .95 leading and .95 lagging power factors for steady state conditions to meet voltage schedules. Interconnected generators are also required to produce or absorb reactive power up to the thermal capability of the generator during transmission system disturbances. The voltage regulator must 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 is required to be of a fast-response or High Initial Response type (the voltage response time is 0.5 seconds or less). 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 Cleco Control Area to assure proper system response to frequency variations. The speed governor system shall have an adjustable droop characteristic setting typically set to 5 percent.

Protective relays will be required to protect a new interconnected generator. It is the generation owner's responsibility to install the proper protective relaying needed to protect the generator equipment in coordination with Abbeville system protection and applicable NERC / SPP standards. The owner of the generator is solely responsible for protecting interconnected equipment in such a manner that faults, imbalances, or other disturbances on the Abbeville system are isolated by the owner's protective equipment and do not cause damage to the interconnected generation facilities.

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 Abbeville's system. For proposed wind induction type generator interconnections, Abbeville will require power factor correction at a minimum. Power factor correction capacitors must be installed either by the owner of the generation or by Abbeville at the owner's expense. Switched capacitor banks supplied by the generation owner shall be coordinated with Abbeville voltage control requirements and switched at the request of Abbeville. 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. Wind generator interconnections are also required to meet the current technical standards for Low Voltage Ride Through capability and Power Factor Design

Criteria (Reactive Power) as specified in FERC Order 661 and SPP Appendix G to the LGIA.

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 58.0 to 61.8 Hertz (per NERC PRC-024 frequency curves). Even larger voltage and frequency deviations may be experienced for short periods of time and interconnected generators must have capability for off-nominal operation. 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 Abbeville's system protection schemes and NERC requirements.

Generation integration may substantially increase fault current levels at nearby substations. Increased fault currents may exceed existing equipment ratings, interrupting ratings and/or through fault ratings. Any existing equipment replacement costs required due to fault currents associated with new generation is the responsibility of the requesting party. Modifications to the ground grids of existing substations may also be necessary to keep grid voltage rises within safe levels. The ground grid shall be designed to a minimum of ANSI/IEEE Standard 80-2000, IEEE *Guide for Safety in AC Substation Grounding.*

Power system equipment is designed to withstand voltage stresses associated with expected operation. Interconnecting new generation resources can change equipment duty, and may require that equipment be replaced or switchgear, communications, shielding, grounding and/or surge protection added to restrict voltage stress to acceptable levels. System impact and/or Facilities studies will need to include the evaluation of the impact of the interconnected generator on equipment insulation coordination. Abbeville will review breaker duty and surge protection to identify any additions required to maintain an acceptable level of Abbeville system availability, reliability, equipment insulation margins and safety.

All generation equipment ratings shall be submitted to Abbeville and to the RE in accordance with their data submittal requirements. Attachment 1 (Abbeville Generator Interconnection Data Request Form) provides a detailed listing of all of the data requirements associated with a Generator interconnection request.

4.3 Transmission Facilities

Any proposed transmission facility interconnecting into Abbeville's transmission system shall be coordinated and reviewed through the Transmission Planning process described in Section 4.1. The transmission facility addition shall maintain or improve the level of system reliability which existed prior to the interconnection. Power flows as a result of the transmission interconnection shall not overload or adversely affect the Abbeville Transmission System or the SPP Regional Transmission system. Voltage levels shall be

coordinated with substation operational voltage levels. Currently, Abbeville's existing transmission system voltage levels is 138kV. The transmission line/substation design and construction shall be in accordance with good utility practice subject to review and approval by engineering representatives of Abbeville and Entergy.

A transmission system switching study may be required to evaluate transient overvoltages caused by switching operations involving the proposed new transmission line. The requestor is responsible for all Louisiana State required approvals, environmental requirements, protection coordination, interconnection metering, maintenance and control coordination. The thermal ratings for the proposed transmission facilities shall also be provided to Abbeville and subsequently submitted to the RE. The thermal ratings shall be coordinated with industry standards and Abbeville's thermal rating assumptions contained in Abbeville's Facility Ratings Methodology document.

4.4 End – User Facilities

Typical end-user facilities considered for interconnection would encompass load (dynamic and static) and reactive devices (capacitors and reactors). The impacts on the transmission system must be studied to address any special operational limitations or facility requirements.

All end-use load connected directly to the Abbeville system are to maintain a power factor between 0.95 lag and 0.95 lead as measured at the point where the load interconnects with Abbeville-owned facilities. If this power factor requirement is not met, Abbeville may install power factor correction equipment at the load owner's expense.

Entergy maintains transmission voltages at levels required for the reliable delivery of electricity. Regulation to keep voltage variations within limits acceptable to end-use customers is typically provided at the distribution system level. Voltage regulation at transmission voltage levels is different from distribution voltage levels. Entergy 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. Load owners 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.

All end-user facilities connected to the Abbeville system must meet the power quality standards commensurate with good utility practice. The requestor is responsible for any mitigation efforts necessary to meet those standards.

Abbeville's system protection requirements are designed and intended to protect the Abbeville system. Additional protective relays are required to protect an interconnected end-user facility. It is the requestor's responsibility to install the proper protective relaying needed to protect the end-user facilities. Abbeville does not assume responsibility for protection of the interconnected end-user facilities. The requestor is solely responsible for protecting interconnected equipment so that faults, imbalances or other disturbances on the Abbeville system do not cause damage to the end-user facilities.

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

5.0 Technical Requirements

5.1 Power Quality

Unbalanced phase voltages and currents can affect protective relay coordination and cause high neutral currents and thermal overloading of transformers. To protect Abbeville and customer equipment, the interconnected facility contribution at the point of interconnection shall not cause a voltage unbalance (Phase to Phase) greater than 2 %, or a current unbalance greater than 5 %. Phase unbalance is the percent deviation of one phase from the average of all three phases, based on the actual voltage (not nominal), based on the 95th percentile.

Any switching operation or energization of the Customer's facilities will not cause a voltage change (delta V) of greater than 3 % at the point of interconnection with Abbeville. Application examples are; energizing the step-up transformer or any fixed shunt switching operation. The measurement will be in accordance with IEC 61000-4-30.

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 Abbeville 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 Abbeville's system to determine whether the 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 Abbeville system. This method significantly limits the amount of voltage and current harmonics entering the Abbeville 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. The system shall be designed such that the maximum voltage fluctuation for starting motors, switching transformers, and switching reactive devices will be 3 % or less. All generators/loads

connecting to the Abbeville system shall comply with the limits set by this Standard.

Special studies, such as Electro-magnetic Transients Program (EMTP) may be required to analyze the power quality impacts of a proposed facility. The requestor will be responsible for the costs of any required special studies.

5.2 Engineering

Abbeville will provide for engineering design and specifications of the proposed interconnection for Abbeville owned facilities. All engineering costs and engineering review costs for Abbeville owned facilities are the responsibility of the requesting party. For facilities owned by others, prints of applicable drawings will be furnished to Abbeville upon request.

If the interconnected facilities are to be owned by Abbeville, then any new land rights necessary for the interconnection may be acquired by Abbeville circumstances, the requesting entity may also acquire these additional land rights, provided they coordinate with Abbeville as to what rights are necessary.

Modifications to Abbeville's transmission system to accommodate the proposed interconnection shall adhere to currently accepted good utility practice for 138Kv transmission systems.

The requesting entity will supply drawings via an electronic file or other common storage device, compatible with computer-aided design systems, AutoCAD preferred. "As-built" drawings must be provided prior to final approval by Abbeville for non-Abbeville-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 Abbeville within 60 days of any modification to non-Abbeville owned equipment or substations on Abbeville's system.

Breakers and switches installed in Abbeville substations shall adhere to Entergy numbering schemes. Breaker and switch operation numbers will be assigned by Entergy. All switches to be operated by Abbeville will be locked with locks furnished by Abbeville and Entergy. All switches to be owned by Abbeville and operated by Entergy shall be designed in accordance with Entergy's standards.

5.3 Substations

Generally, power circuit breakers must be installed at all interconnections with Abbeville's system. Typical specifications covering circuit breaker requirements are available from Abbeville upon request. A review of the surrounding area power system characteristics, including system stability studies, will be made for a final determination when the need for out-of-step switching capability is questionable.

Installation of equipment in substations must conform to Abbeville's requirements and must be approved by Abbeville. 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 (less than 2 parts/million). Certification shall be provided to Abbeville 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 will be borne by the requesting entity.

The owner of installed equipment will be responsible for its proper operation and maintenance. Equipment must be operated and maintained in accordance with manufacturer's recommendations, prudent utility practices, applicable NERC / Regional standards, and applicable environmental and safety standards. Abbeville may require additional equipment to assure a reliable interconnection and to safeguard the proper operating conditions of its power system.

The interconnection substation must have a ground grid that solidly grounds all metallic structures and other non-energized metallic equipment. This ground 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 substation under normal and fault conditions. The ground grid shall be designed to ANSI/IEEE Standard 80-2000, IEEE *Guide for Safety in AC Substation Grounding*.

Abbeville or its designated representative will conduct an inspection of the 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.

5.4 Transmission Line Taps

Proposed taps to Abbeville's transmission or subtransmission system are subject to approval by Abbeville on a case-by-case basis. Abbeville cannot provide 138kV transmission line taps as it owns no 138kV transmission lines.

5.5 System Protection

Protective relaying requirements for each interconnection and relay scheme coordination will be determined by Abbeville after review of the proposed interconnection and short circuit study work. Abbeville requires receipt of a preliminary functional single-line drawing including relaying, current/potential transformer and basic control/tripping connections for the proposed interconnection and a single-line drawing and maps of the requesting entity's system in the area. Any proposed pilot protection scheme (POTT, DCUB, DTT, etc…) including proposed communications channel and relay connections should be provided. The requestor will be required to provide all equipment ratings and positive, negative and zero sequence impedance data necessary to adequately model the proposed interconnection facility in a short circuit analysis. See requirements in Attachment 1. The requestor should also provide re-closer and fuse ratings, and relaying data necessary to address protective relaying coordination in accordance with NERC /

Regional standards and requirements. High-speed piloted or communication assisted primary relaying, secondary relaying, breaker failure, and out-of-step relaying are normal Abbeville requirements for 138kV interconnections. Abbeville will determine if the primary relaying scheme needs to be piloted, both the primary and secondary schemes needs to be piloted or if no piloted schemes are necessary for system stability. All short lines will have dedicated fiber for line differential relays for protection as determined by Abbeville.

Specialized relaying may be required to provide automatic load, generation shedding or interconnected system separation. The NERC technical paper for Protection System Reliability will be applied on all BES equipment. The protection system will comply with all applicable NERC PRC standards. The Protection system involves the protective relays, voltage and current sensing devices, associated communication equipment, DC circuitry and Batteries as defined by the NERC PRC standards.

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 Abbeville's Protective Relaying & Maintenance Procedures. Abbeville personnel will need to be notified 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.

5.6 System Operations

Following the execution of an Interconnection and Operating agreement and the successful completion of all construction, inspection and facility checkout procedures, the interconnected facility will be released for energization. The initial synchronization will be supervised and coordinated with Abbeville and Entergy personnel. Future synchronization will be controlled by Entergy's Transmission Operation Center (TOC) personnel and will either be automatic or manual per the direction of Entergy TOC.

All communications and operating procedures during normal and emergency operating conditions will be initiated and controlled by Entergy TOC personnel. Any requests from the interconnected facility for any special operating considerations will be submitted to Entergy TOC for review and approval prior to execution. Emergency operating conditions will be handled in accordance with NERC 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 Entergy TOC. Entergy TOC personnel may not be available immediately during all emergency conditions and the Entergy TOC will communicate the 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 Abbeville's transmission system shall be operated and dispatched by Entergy TOC. The Entergy TOC 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 Abbeville switching and clearance procedures, including use of Abbeville locks and tags.

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

If construction activities are performed by other entities, Abbeville may require at least one Abbeville representative be present to coordinate and provide for switching, clearances, special work permits and inspections during construction work on Abbeville's right-of-way. The Abbeville representative will also conduct or observe the operability checkout on equipment, including metering, relay settings and tests and protective device operation (circuit breakers, motor-operated disconnects, etc.). Final electrical connections to Abbeville's system will be made by Abbeville or under Abbeville's supervision.

Maintenance will normally be performed by and at the expense of the entity that owns the equipment or facility. Abbeville 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 Abbeville's transmission system. Abbeville shall also have the right to enter interconnected facilities for emergency operation and maintenance of equipment or structures Abbeville deem necessary to maintain a reliable power system.

5.7 System Control

Supervisory control by Abbeville of circuit breakers, interrupters or motor-operated disconnects may be required on all interconnections that directly affect the security of Abbeville's transmission system. The cost of providing and installing the RTU at a new location or proportionate cost of modifying an RTU at an existing facility will be at the expense of the requesting entity. Abbeville will perform the necessary expansion, including hardware and software changes, to the EMS / SCADA master station equipment at the requesting entity's expense for that portion attributed to the new interconnection. Transducers, interface hardware and appropriate communication channels compatible with existing EMS / SCADA system requirements shall be furnished by the requesting entity. Specifications for such equipment will be provided upon request. The requesting entity shall provide necessary auxiliary and control relays, hot-line indication, supervisory local / remote switches, and all other equipment necessary to interface with Abbeville's supervisory control equipment.

Interconnections that establish additional or new balancing area boundaries require the requesting entity to furnish all necessary balancing area metering equipment. These requirements may include, but are not limited to:

1. Analog and/or digital telemetering at the point of interconnection.

2. Analog to digital conversion equipment and tone gear, as required, at both the point of interconnection and Entergy TOC.

3. Totalizing equipment at the point of interconnection or some intermediate point on the communications link. A multiport RTU may be substituted in some cases. If a multiport RTU is used, a points list identifying alarms, events and telemetered quantities will be jointly developed between the requesting entity and Abbeville. The service agreement implementing the multiport RTU will include operating/dispatch jurisdiction, primary and backup service control protocol, SCADA tagging and control design, switching procedures and definitions of terms used by the system operators.

4. Automatic Generation Control (AGC) hardware and software modifications to Entergy TOC and other organization's power system control centers (if required).

Abbeville's telemetering, scheduling and interconnection metering are performed on a megawatt or whole megawatthour basis, therefore, interconnection metering and totalizing equipment shall meet this criterion. Dynamic schedules to the appropriate automatic generation controller may be a consideration for radial tap lines to the Abbeville system whenever the load is supplied from a source outside the Abbeville balancing area. Similarly, internal generating resources supplying loads outside Abbeville's load control area may require special equipment at Abbeville's and other power system control centers.

5.8 Telecommunications

The requesting entity shall provide telecommunications facilities sufficient to meet Abbeville'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. Abbeville 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 Abbeville. The requesting entity will reimburse Abbeville for the costs of any additional facilities provided by Abbeville.

Fiber optic additions to new or existing Abbeville 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. Abbeville 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 Abbeville.

5.9 Metering

Abbeville will procure and supply all required metering equipment at the requestor's

expense. 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.

Coupling capacitor voltage transformers (CCVTs) will not be used for metering.

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 Abbeville.

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Attachment 1

Abbeville Generator Interconnection Data Request Form

Requestor:

Organization: _____

Contact: _____

Address: _____

_____

Phone: _____

E-Mail: _____

Interconnection Site Information:

_____ Proposed New Generation Facility

Physical Location Site Description (Parish, 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:

Machine MVA: _____
Power Factor: _____
Terminal Voltage (kV): _____
Machine Speed (RPM): _____
Frequency (Hz): _____
Short Circuit Ratio: _____

Generator Modeling Data:

Please supply the following generator performance modeling data:

1. Reactance Data (Per-Unit Machine MVA Base) for both Direct Axis and Quadrature Axis
2. Time Constant Data (Sec)
3. Open Circuit Subtransient
4. 3-Ph Short Circuit Armature
5. Armature Winding Resistance
6. Total Inertia (Generator + Turbine)
7. Generator Characteristic Curves
8. Generator Reactive Capability Curves
9. Generator Vee Curves
10. Generator Saturation Curves

Excitation System Data
Identify appropriate IEEE model block diagram or PTI 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
Identify appropriate IEEE model block diagram or PTI 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, Abbeville 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 Abbeville.

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 PTI PSS/E 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_____
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 Abbeville.