



TRANSMISSION LINE & SUBSTATION PROJECTS

COMPANY: PID 213 GI PLANT

CUSTOMER: PID 213 GI PLANT

FACILITIES STUDY

EJO # F4PPLA0298

INTERCONNECTION FACILITY STUDY
LOUISIANA

PID 213

Revision:

2

Rev	Issue Date	Description of Revision	Prepared By	Approved By
A	4.1.08	Place template in eRoom for team input	EG	RG
B	6.2.08	Design Input	EG	RG
C	6.23.08	Issued To Construction for Input	EG	RG
D	7.7.08	Issued to JET for Approval	EG	RG
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2	7.25.08	Added Upgrade Classifications	BF	JDH

* Note: All required JET approvals and other stakeholder concurrences are shown in the voting polls in eRoom.

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1. EXECUTIVE SUMMARY

The facility study serves as the scope document for Interconnection Request PID # 213. This Facility Study will include a project scope and a $\pm 20\%$ cost estimate for the designated project. Unlike a Project Execution Plan, the Facility Study will omit sections and sub-sections not required for compliance with this request.

The purpose of this facility study is to identify the transmission requirements for interconnection of a 41MW blackstart unit at the existing Waterford 1_2 substation.

2. SAFETY AWARENESS

Safety is a priority with Entergy. Safety will be designed into substations and lines. The designs will be done with the utmost safety for personnel in mind for construction, operation, and maintenance of the equipment.

All employees working directly or indirectly for Entergy shall adhere to all rules and regulations outlined within the Entergy Safety manual. Entergy requires safety to be the highest priority for all projects. All Entergy and Contract employees must follow all applicable safe work procedures.

Should the work contained within this Facility Study be approved, a detailed Safety Plan will be formulated and incorporated within the project plan.

3. SCOPE SUMMARY

The overall scope of this project is summarized as follows:

3.1 Waterford 230kv switchyard substation

The scope of work at this substation will be a replacement of the existing line panel looking at the Waterford 1_2 standby startup transformer line. This will involve the installation of new control cable for the new line panel to the existing line breakers.

3.2 Waterford 4 Substation

The scope of work at this substation will be to install a new line panel in the new blackstart control house. In addition three new 230kv CCVT's will be installed on the line tap for relaying.

The communications path from the existing Waterford 230kv switchyard to the location of the blackstart unit was explored using fiber optics but due to cost and schedule constraints this option was not chosen.

3.3 General Assumptions

- Upon receipt of formal approval from customer authorizing design and construction, Entergy will prepare a detailed project execution plan.
- All required permits (if applicable) will be attainable in a reasonable period.
- All costs represent good faith estimates in today's dollars. Price escalation for work in future years has not been included.

3.4 Automatic Generation Control

- Upgrades required by Entergy for AGC service are discussed in Entergy's OASIS posting "Entergy Transmission Guidelines for Automatic Generator Control Applications". See link below:

<http://oasis.e-terrasolutions.com/documents/EES/AGC%20Guidelines%20for%20Entergy%20Transmission.pdf>

4. SCOPE DETAIL

4.1 Waterford 230kV Switch Station – Replace Line Panel

General

- The existing Waterford 230kV switch station serves the Waterford 1_2 generator yard via one 230kV line with a standby startup transformer located on the Waterford 1_2 end of the line. There is currently carrier relaying that trips the two breakers at the Waterford 230kV switchyard upon receipt of a transmit signal from the standby startup transformer differential relaying. This carrier scheme concept will be used to protect the line from the Waterford 230kV yard although will be upgraded to current standards.

Site

- No site work will be required at this station.

Foundations

- No foundation work will be required at this station. Although new control cable will be installed, it is planned to use the existing trough system for this new cable.

Electrical

- No Steel and Electrical work will be required at this station.

Relay

- Install new control cable from the new panel to the existing line breakers S7161 and S7166.

- Remove existing SU line and breaker panel. This panel has the controls and breaker failure for breaker S7166 and the breaker failure only for breaker S7161.
- Purchase and install one (1) Entergy standard Line/Double Breaker control panel with 3F unblocking carrier communication. The carrier must be 3F to accommodate the transfer trip scheme for a transformer differential at Waterford 1 and 2. This panel will be designed to have control and breaker failure for S7166 and breaker failure only for S7161.
- Coordination with the setting group will be needed to get the existing frequency presently being used between the substations. This frequency will be used with the new relaying.
- Reuse the existing line trap and tuner.
- The existing control house at the Waterford 230kV switchyard has adequate space to install the new line/double breaker panel. A line/double breaker control panel will be ordered to accommodate the breaker failure of breaker S7161. The controls for this breaker will remain on the existing panel.

Relay Settings

- Settings will be required for the line/double breaker panel.
- Communications and SCADA
- Add alarms to RTU for line/breaker panel.

Metering

- Upon project plan development of this project, the project team looked at options for the metering of this blackstart unit. A copy of a white paper is included as an attachment to this study as reference.
- The metering was decided to be included at the low voltage level (either 13.8kV or 480V) but the exact location was not determined at the time of publishing this document. The local Entergy metering group will coordinate with fossil group as to providing purchasing and installation specifications. The metering isn't in the transmission scope of work.

4.2 Waterford 4 Substation – Install Line Relaying

General

- The fossil group will be constructing a new substation area for the new 41MW blackstart unit very near to the existing Waterford 1_2 plant. The

bus connection for the 230kV breaker and blackstart transformer will be on the 230kV side of the standby startup transformer. A new control house will be erected to house the blackstart unit control equipment along with the new transmission asset owned line relay panel and RTU equipment.

Site

- There will be no site work needed because the fossil group will be building a new yard and will do the site work required. The equipment to be installed will be inside the new yard. It will be estimated that 75 tons of limestone will be needed in order to clean up and grade work area after construction.

Foundation

- Install three (3) CCVT foundations. Ampirical will be performing all engineering and procurement. The preliminary design, which will be used for estimating, has the foundation consisting of one 14" x 14" x 55' concrete pile with a 3' x 3' x 3' concrete cap.
- The EMCC design group will need to perform a design review of all foundation designs.
- The new CCVTs shall be grounded according to Entergy Transmission specifications. If the available fault current is above 40 kA rms symmetrical, then 500 kcmil copper ground leads shall be used. At the time of publishing this document the overall fault study for the new plant wasn't available.
- The CCVTs shall be connected together by one (1) two-inch schedule 40 PVC conduit below grade to a common junction box. Above grade conduit between the CCVT and the ground will use a reducer to transition to 1-1/2 inch flexible Sealtight because the orifice on the CCVT is 1-1/2 inch. The junction box will be connected to the nearest trough using two (2) two-inch schedule 40 PVC conduits. Allowances for conduit and grounding have been made in the estimate. The junction box will be ordered under the relay portion of this scope. See 4.1.4 for CCVT and junction box details.

Electrical

- Install three (3) CCVTs mounted on pedestals for relaying. The pedestal height will be determined in the design phase, and will depend on the height of the overhead bus. Each CCVT will be installed beneath a new bus which will be constructed by the fossil group between the existing line entrance and the new breaker ahead of the new generator step up (GSU) transformer. Transmission is responsible to install the CCVTs, the line side jumpers, the CCVT junction box, and any associated above- and below-grade conduit to the nearest trough. One trap shall be installed ahead of the new generator breaker.
- Ampirical will complete all design drawings and procure all necessary equipment and material. The Transmission design group will review all drawings pertaining to the CCVTs. The Fossil Group will coordinate installation of this equipment by its contractors.

Relay

- Presently the Waterford 1 and 2 SU line is fed radial from the Waterford 230kV switchyard through breakers S7161 and S7166. The relaying for the SU line is located at the Waterford 230kV switchyard (GE type - CEY51A and JBCG53 relays). This panel has the control and breaker failure for breakers S7166 and the breaker failure only for S7161.
- At the Waterford 1 & 2 substation there is no high side breaker so the transformer differential uses carrier to send a transfer trip to the 230kV switchyard. The transmitter is located at the Waterford 1 and 2 substation and a receiver located at Waterford 230kV switchyard.
- With the addition of the black-start generator and a breaker the existing relaying at the Waterford 230kV switchyard and the transfer trip schemes will be replaced with the Entergy standard line/breaker panel with carrier communication. The carrier must be 3F to accommodate the transfer trip from the SU transformer differential. The existing transfer trip frequency will be used for the new carrier communications. Coordination with the setting group will be needed to get this frequency.
- A new control house will be built at the Waterford 1 and 2 substation. This house will be owned by fossil and have adequate space to accommodate transmission relaying and RTU. The control house itself is not a part of this estimate.
- The following relay components are in the scope:
- Purchase and install one (1) Entergy standard Line/Breaker control panel with 3F unblocking carrier communication. The carrier must be 3F to accommodate the transfer trip scheme for a SU transformer differential.
- Purchase and install a line trap
- Purchase and install a line tuner
- Reuse the existing CVT.
- Install three (3) CVT's for the new line relaying (CVT's have been purchased)
- Purchase and install a D25 RTU to accommodate the alarms. Fossil will be responsible for getting the generator data to the SOC and TOC

Relay Settings

- Setting will be required for the line/breaker panel
- Review setting for the transformer differential panel
- Communications and SCADA
- GE D25 RTU
- Add alarms to RTU for line panel and breaker
- Circuit will be required to get D25 information to TOC
- Fossil maintains the existing RTU so coordination will have to take place if the transmission line data will use this same route.

Metering

- All existing metering is accomplished by meters located on the low side of the generator step up transformers and the low side of the standby-startup transformer.

- All metering at the Waterford blackstart unit will be accomplished by installation of Entergy standard meters on the low voltage side of the generator step-up transformer. This is outside the scope of transmission and will be handled by the fossil group along with coordination with the Entergy metering group and the consultants performing the switchyard procurement.
- Proper coordination with the SOC will need to happen in order to configure the metering calculations for the appropriate units being operated.

Blackstart Plan

- At the start of this W4 blackstart project, the current Amite South blackstart procedure was centered around the Paterson generator. Since Katrina, this generator has been retired and it was decided to install the blackstart unit for the Amite South area at the Waterford 1_2 location. A new procedure has been drafted and is available. It will be finalized upon full review of the project team and implemented upon placement of this project in-service.

5. COST

The ICT has reviewed and determined whether each required upgrade will be considered a Base Plan Upgrade or a Supplemental Upgrade. For more information on cost responsibility for Base Plan and Supplemental Upgrades, see Attachment T to Entergy’s OATT.

The costs shown in the table include overheads and AFUDC, but do not include tax gross up. Entergy incurs a tax liability proportional to the amount of customer contributions. In addition to proposed project costs, the customer may be charged a “Tax gross-up” at applicable rates. Rates are subject to change. Current TGU rate is 31.677% and is not included in any of the estimates.

Projected Costs

	Total Cost	Current Year (2008)	Future Year (2009)
Direct	\$627K	\$172K	\$456K
Indirect	\$300K	\$84K	\$216K
Full Financial	\$927K	\$256K	\$672K

6. UPGRADE CLASSIFICATION

The ICT has reviewed the projects identified and have determined that all projects are classified as Supplemental Upgrades. For more information on cost responsibility for Base Plan and Supplemental Upgrades, see Attachment T to Entergy’s OATT.

Projected Costs in 2008 dollars

Lines / Substations	Base Plan	Supplemental Upgrades
4.1 Waterford 230kV Substation	N/A	\$330,000
4.2 Waterford 4 Substation	N/A	\$597,000

7. SCHEDULE

A detailed schedule will be prepared subsequent to customer approval to proceed with the project. Based on the Task duration schedules listed below, the overall project in-service date is projected to be 6/1/2009. The following are rough durations:

Task Name	Proposed Start Date	Proposed ISD
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Waterford 230kV Substation	4.22.09	4.29.09
Waterford 4 Substation	12.15.08	4.29.09

Notes to Duration Schedules:

- All construction work requiring outages will be performed during acceptable periods of system load flow, which most often is the off-peak load season. Line outages will be discussed with the SOC and TOC and the assumption is made that line outages will be executed as planned. However, last minute denial of outages by the SOC/TOC along with resulting schedule delay is possible.
- Substation construction will be coordinated with the transmission line outages when possible.
- Construction resources are available when required.
- Transmission Line and Substation projects will begin subsequent to Definition phase Project Execution Plan.
- This schedule does not account for adverse weather conditions.
- Schedule durations are high level estimates at this time. A detailed schedule will be prepared upon project approval.

8. ATTACHMENTS

A. Table of Acronyms

ACSR	Aluminum Conductor Steel Reinforced
ACSS	Aluminum Conductor Steel Supported
ADEQ	Arkansas Department of Environmental Quality
AFUDC	Allowance for Funds Used During Construction
ATC	Available Transfer Capability
EES	Entergy Control Area
EHV	Extra-High Voltage
ICT	Independent Coordinator of Transmission
kV	Kilo-Volt
MCM	(M) Thousand Circular Mils
MVA	Mega-Volt Amp
MW	Mega-Watt
NPDES	National Pollution Discharge Elimination System
NOI	Notice of Intent
OASIS	Online Access and Same-time Information System
OATT	Open Access Transmission Tariff
OG&E	Oklahoma Gas & Electric
POD	Point of Delivery
POR	Point of Receipt
SES	Steam Electric Station
SOC	System Operations Center
SHPO	Arkansas State Historic Preservation Office
SHV	Super High Voltage
SW	Switch Station
SWEPCO	Southwest Electric Power Company
TOC	Transmission Operations Center
WMUC	City of West Memphis Control Area

B. Scope Summary Diagram / Area Map

C. One Line Drawings

D. Duration Schedule