



## SCOPE OF WORK – SIPORORO

**Customer:** PDV

**Date:** Feb 5<sup>th</sup>. 2010

**Location:** Venezuela

## PROJECT OVERVIEW AND SITE DESCRIPTION

### 13.8 kV Substations

This Scope of Work describes a preliminary plan for the interconnection of the generation units to the low side of the transformers to the 13.8kV / 115kV transformers installed on the existing substation. SIPORORO substation contemplates the installation of 4 GE TM 2500 and the preliminary proposal would be to install a copper bus supported by an additional steel structure on the secondary of the mains GSU and create a common 13.8 kV bus for each two units. The total output power for each unit is around 22 MW totalizing 88MW for this plant. The HV Substations includes but is not limited to the following main components:

- Concrete Foundations
- 13.8kV Circuit breakers
- 13.8kV Disconnect switches
- 13.8kV Current Transformers
- 13.8kV/ $\sqrt{3}$  Inductive Voltage Transformers
- Surge arresters on the GSU transformers
- 13.8kV Bus and steel structure supports
- Analysis of 125 VDC power system
- Analysis of 120V Lighting and auxiliary power panels and transformers
- Coordination of existing protection system
- Non Revenue Metering (net power)
- Interconnecting cable and raceway/trenches.
- Substation ground grid interconnection
- Lightning protection

## Site Description

### PLANT SITE CONDITIONS

Electrical installations shall be suitable for the conditions as follows:

Location(s)	Sipororo, Edo. Portuguesa - Venezuela
Type of Installation	Outdoor
Plant elevation (above sea level)	229 meters
Seismic & Civil Design Criteria	Not a Seismic zone
Ambient Temp Range	21 degrees C to 38 degrees C (average ambient temperature for any 24 hour period shall not be higher than 30°C)
Max. Wind Velocity	14 km/hour (23 mph)
Max. Humidity	100 %

The layout for the Generation units will define the layout of the two common bus and the location of its supports and foundations. The interconnection of the switchgear for all units will be done by installed 15kV cables. All foundations shall be by civil contractor and supervised by PES personnel for adherence with the project and QA/QC purposes.

PES will be responsible for detailed design and engineering, procurement of materials, construction management and erection along with commissioning and testing to meet design criteria specified to build and commission the 13.8kV system as well as the coordination study. The layout of the substation shall allow for maintenance of equipment without removal of fence sections.

Substations Option includes but is not limited to the following main components:

- Install 13.8 kV equipment and bus connections to main transformer
- 13.8 kV Disconnect Switches
- 13.8 kV Circuit Breakers
- 13.8 kV Post Insulators with stands
- Steel structures for short 13.8 kV interconnection
- Current transformers
- Voltage transformers
- surge protection
- grounding
- Control and protection building and panels adaptations

# **PES SCOPE OF ACTIVITIES**

## **1 PROJECT MANAGEMENT**

- 1.1 EXECUTION PLAN
- 1.2 SCHEDULING
- 1.3 REPORTING
- 1.4 CHANGE CONTROL

## **2 TECHNICAL DATA**

- 2.1 DESIGN DOCUMENTS
- 2.2 ENGINEERING, CONSTRUCTION AND COMMISSIONING SPECIFICATIONS
- 2.3 DRAWINGS
- 2.4 LISTS, INDEXES AND SCHEDULES
- 2.5 DOCUMENTS FOR REVIEW AND APPROVAL
- 2.6 FACILITY INTERCONNECT
- 2.7 UNITS OF MEASURE
- 2.8 LANGUAGE
- 2.9 FACILITY OPERATION & MAINTENANCE MANUALS, TRAINING MANUALS
- 2.10 AS-BUILT DRAWINGS

## **3 PROCUREMENT**

- 3.1 VENDOR QUALITY CONTROL
- 3.2 SPARE PARTS
- 3.3 EXPEDITING

## **4 TRANSPORTATION**

## **5 CONSTRUCTION**

- 5.1 CONSTRUCTION MANAGEMENT STAFF
- 5.2 SAFETY PROGRAM
- 5.3 ENVIRONMENTAL PLAN
- 5.4 QUALITY CONTROL PROGRAM
- 5.5 INSPECTION AND WITNESSING
- 5.6 ELECTRICAL POWER FOR CONSTRUCTION
- 5.7 WATER FOR CONSTRUCTION

## **6 TESTING AND COMMISSIONING**

- 6.1 COMMISSIONING ACTIVITIES
- 6.2 SYSTEM TURNOVER

## **7 OPERATION AND MAINTENANCE TRAINING**