

Section 2.0 Scope of Work and Supply

The Scope of Work and Supply is comprised of the following outlined items:

Major Generation Equipment

Installation of three (3) Owner Supplied Pratt & Whitney FT8 -3 SwiftPac gas turbine generator packages complete with auxiliary skids, modular control rooms, inlet filters and exhaust stacks.

Pratt & Whitney interface points are as follows:

Equipment System	P&W FT8-3
<ul style="list-style-type: none"> All supply piping, including Fuel Gas, Liquid Fuel, Demineralized Water, Lube Oil, Compressed Air, Instrument Air, Hydraulic Start Oil 	<ul style="list-style-type: none"> Flanged or threaded connection on SwiftPac base plates.
<ul style="list-style-type: none"> Inlet Air-to-Filter 	<ul style="list-style-type: none"> Atmosphere
<ul style="list-style-type: none"> Turbine/Generator Ventilation Air 	<ul style="list-style-type: none"> Atmosphere
<ul style="list-style-type: none"> Turbine Exhaust 	<ul style="list-style-type: none"> Flange & Expansion Joint for connection to Exhaust Stack
<ul style="list-style-type: none"> Instruments on SwiftPac Base plate 	<ul style="list-style-type: none"> Terminal box on base plate
<ul style="list-style-type: none"> Instrument wiring in Turbine Control Panel 	<ul style="list-style-type: none"> Terminal in Turbine Control Panel
<ul style="list-style-type: none"> High Voltage Connections 	<ul style="list-style-type: none"> Bus bar in SwiftPac generator line side cubicle
<ul style="list-style-type: none"> Generator Ground Connections 	<ul style="list-style-type: none"> SwiftPac Neutral cubicle
<ul style="list-style-type: none"> Electric Motors 	<ul style="list-style-type: none"> With cables & conduits from Control Module
<ul style="list-style-type: none"> Ladders and Platforms for Air Filter 	<ul style="list-style-type: none"> Ladders and Platforms for Inlet Air Filter and Vent Fans

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2.0 Balance of Plant

The contractor will design and install the facility as described in the following sections of this document. The design will include the necessary Structural, Mechanical, Electrical, Instrumentation, and Control System to install the above Major Equipment.

The Balance of Plant scope of supply will be comprised of the following:

- Contractor will provide complete design of the facility including civil, structural, buildings, mechanical, electrical, instrumentation and control.
- Contractor will provide concrete foundations, plant gravel, and access roads
- Owner will provide a reasonably level graded site.
- Owner will provide access roads to the site.
- Owner will provide (3) 13.8 KV to 230 KV, 75 MVA GSU Transformers
- Contractor will provide Installation of the complete Power Plant with the inter-ties as described later in this document and including:
 - Mechanical installation of the various items of equipment with the associated inter-ties of, gas fuel, liquid fuel, sanitary sewer, and waste water.
 - Electrical installation of the plant including the 13.8Kv interconnect cable, plant electrical for BOP equipment, area lighting, grounding, lightning protection, and cathodic protection.
 - Installation of Instrumentation and Control System including plant instrumentation, metering, and Plant remote DCS PLC.

2.1 BOP Major Mechanical Systems

2.1.1 Simple Cycle Exhaust Stack

The Contractor will install 25 ft. exhaust stacks in accordance with the standards set out by Pratt & Whitney for each SwiftPac machine.

2.1.2 Plant Fuel Gas System

The Contractor will install the plant fuel gas system outlined as follows:

- Interconnect to PDVSA gas metering station above ground at the Plant boundary.
- Install three (3) redundant coalescing filter separators on a common skid including redundant pressure regulators.
- Install the Owner Provided fuel gas compression plant with three (3) ea. 100% Arriel Gas Compressors to raise the available supply pressure to the required 500 psi. supply pressure to the gas turbines.
- Install all plant fuel gas carbon steel piping, valves and fittings from plant inlet fuel gas interconnect to the fuel gas regulator filter.
- Install stainless steel piping from the fuel gas filter to the gas turbine generator.

2.1.3 Plant Liquid Fuel System

The Contractor will design and install the plant liquid fuel system outlined as follows:

- Install a pipeline of HDPE or Carbon Steel from the Owner provided Liquid Fuel Treatment facilities at the Site to each Gas Turbine fuel filter-regulator skid.
- Provide and Install two (2) each 650,000 gallon carbon steel raw fuel storage tanks.
- Provide and install two (2) each 250,000 gallon stainless steel clean fuel storage tanks
- Install three (3) 100% capacity liquid fuel forwarding pumps.
- Install three (3) 100% capacity liquid fuel filter/regulator skids.
- Provide and install all plant liquid fuel carbon steel piping, valves and fittings from the plant liquid fuel day storage tanks to the liquid fuel filter regulator skids.
- Install liquid fuel injection pump skids.
- Provide and install stainless steel piping, valves and fittings from the liquid fuel filter regulator skids to the Gas Turbine Generator package fuel connection.

2.1.4 Water and Demineralized Water System

Contractor will install the plant Water Treatment System outlined as follows:

Owner Supplied Equipment

- Install Owner provided Multi- Media filter and R.O. system

Contractor Supplied Equipment

- Provide and Install a pipeline of HDPE from the Demin Water Treatment facilities at the Site to Contractor provided one (1) each 1,000 m³ or 260,000 gallon approximately stainless steel Demin Water storage tanks.
- Provide and install EDI Demineralized system as required to meet engine specification
- Provide and Install three (3) 100% capacity Demin water forwarding pumps.
- Provide and Install three 100% capacity Demin Water filter/regulator skids.
- Provide and install all plant Demin water Stainless steel or HDPE piping, valves and fittings from the plant Demin Water storage tanks, to the Demin injection pumps and to the (3) Demin water injection connections at each of the GTG's.

2.1.5 Oily Water Drain System

The Contractor will furnish and install the oily water drain system as follows:

- Furnish and install below ground two (2) oily water separators with associated pumps and ancillaries.
- Furnish and install PVC or HDPE below ground piping and fittings from concrete oil containment units located at:

- 1) All Transformers
- 2) Gas Turbine Generator Auxiliary Skids
- 3) Liquid Fuel Treatment system

Piping is to be routed to the oily water separator and then to the waste oil storage tank. Provisions are to be made to pump out the waste oil to a truck for disposal, which will be provided by the Owner.

2.1.6 Plant Fire Water System

The Contractor will furnish and install the Firewater System that includes:

- A combination Raw Water and Firewater storage tank
- A Dooley Tackleberry Firewater pump designed system with electric, diesel and jockey pumps designed at 840 GPM at 100 PSI or higher
- Install HDPE 10" diameter HDPE pipeline from Fire Water Pump shed.
- Headers routed throughout the plant in accordance with NFPA Codes sized as 10" HDPE pipe.
- Monitors and Hydrants installed in accordance with NFPA Codes
- Portable fire extinguishers

2.1.7 Instrument and Service Air Systems

The instrument and service air systems will be as follows:

- Furnish and install one (1) set of two (2) instrument and service air screw compressors with associated dryer and air storage tanks.
- Furnish and install carbon steel piping, valves, fittings and instruments for instrument and service air systems from the air compressors to various required areas throughout plant for instrument air and service air. Furnish the appropriate quick connect connectors.

2.2 BOP Electrical Systems

2.2.1 13.8 KV System

The Contractor will perform the following work on the 13.8 KV system:

- Install three (3) 13.8 KV 3,000 amp generator circuit breakers with PT's and CT's.
- Furnish and install all 13.8 KV cabling, bus work, cable tray etc. from the generators to the generator circuit breakers.

2.2.2 13.8/4.16 KV System

The Contractor to provide the following:

- Furnish and install three (3) 13.8 KV NEMA 3R fused disconnects
- Furnish and install one (1) 13.8KV / 4160V auxiliary power transformer for the fuel gas compressors.
- Furnish and install three (3) 13.8KV / 480 volt auxiliary power transformer.
- Furnish and install three (3) 4160 V MCC's for Gas Compressors

2.2.3 480V System

The Contractor will provide the 480V system as follows:

- Furnish and install one (1) 480 V distribution switchboard
- Furnish and install one (1) BOP 480V MCC
- Furnish and install cable tray / conduit with cabling from transformers to MCCs and from MCCs to plant 480V equipment and motors.
- Furnish and install underground conduit, duct banks, or overhead cable tray mounted on the pipe racks.

2.2.4 120/208 System

The Contractor will provide the 120/208 system as follows:

- Furnish and install 480V/120/208V transformers, distribution panels and lighting panels as required with associated conduits, fittings and wire.

2.2.5 Plant Area Lighting

The Contractor will provide the plant area lighting as follows:

- Furnish and install area lighting consisting of twenty (20) 25 ft galvanized metal poles with three (3) 400 watt metal halide floodlights on each pole sufficient to illuminate both GTG's and common areas.

2.2.6 Ground Grid

The Contractor will provide the ground grid for the plant as follows:

- Furnish and install plant ground grid with associated ground rods and connections to plant equipment, buildings and fence.

2.2.7 Plant Electrical Cable Tray

The Contractor will provide the plant electrical cable tray work as follows:

- Furnish and install aluminum cable trays throughout plant. Cable trays to be mounted on pipe racks, cable trenches or within buildings for routing plant cabling. A separate cable tray will be installed for each of the 15/5KV systems, 480V system, and instrumentation system cables.

2.2.8 Underground Conduit and Cable Systems

The Contractor will provide the plant underground conduit and cable system as follows:

- Furnish and install rigid galvanized conduit or PVC encased in concrete for all underground power, control and instrumentation systems.

2.2.9 Lightning Protection

The Contractor will provide lightning protection as follows:

- Furnish and install lightning protection on each gas turbine exhaust stack.
- Furnish and install lightning protection for the 115 KV substation

2.2.10 Batteries / Chargers / UPS Systems

The Contractor will perform the following work on the batteries / chargers / UPS systems:

- Furnish and install BOP UPS system for remote DCS PLC and associated equipment.
- Furnish and install one (1) 125V DC battery and charger for 13.8KV plant switchgear.

Note: 24 VDC and 125VDC batteries and chargers are to be supplied as part of the Pratt & Whitney packaged control house.

2.3 Plant Instrument and Control Systems

2.3.1 BOP Control System

The Contractor will furnish and install a BOP control system consisting of:

- One (1) DCS PLC system and HMI's to be located in the main control room
- Provide and install remote PLC panels as required in certain areas of the site and interfaced back to the main control room DCS
- Three (3) Pratt & Whitney HMI's to interface with DCS System

2.3.2 Plant Instrumentation Devices

- Gas Turbine Control Panel is supplied with each FT8-3 gas turbine mounted in Control Module supplied by Pratt & Whitney.
- Contractor to furnish and install instrument devices, both pneumatic and electric, consisting of meters, pressure, flow, temperature and level where required.

2.3.3 Electronic Wiring and Pneumatic Piping

- Contractor to furnish and install necessary instrument wiring and pneumatic piping with associated Swagelok fittings, etc.

2.4 230 KV Substation

2.4.1 Generator Step-up Transformers (GSU's)

- Contractor to install three (3) Owner Supplied generator step-up transformers with 13.8KV delta to 230 KV wye windings.

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2.4.2 Protective Relaying

- Contractor to supply and install protective relaying for the GSU transformers and provide interface points for other substation protective relay equipment provided by Owner

2.4.3 Site Work

- Contractor to prepare the site and provide the following:
 - Foundations for the GTGs, fuel and water tank area, GSU transformers, buildings, truck off-load and gas compressor.
 - Driveways and roads
 - Gravel

2.5 Plant Communication System

- Contractor to provide communication and public address system for the new plant.
- Contractor to furnish temporary telephones and email capability for construction communication purposes.
- Permanent telephone lines for operation of the plant will be provided by Owner.

2.6 Plant Civil and Structural

- Site preparation, rough grading, and finished grading to be furnished by Contractor based on an existing site requiring minimal cut and fill.
- Contractor to furnish and install all plant reinforced concrete foundations designed to IBC 2003. GSU foundation shall have 9" freeboard.
- Contractor to furnish and install concrete containment curbs and equipment foundations, including ammonia truck filling area.
- Contractor to furnish and install plant gravel and asphalt paving as shown on the Plot Plans.
- Contractor to provide structural steel pipe racks to support overhead piping and cable trays. Pipe racks to be located as shown on Plot Plan drawings.

2.7 Plant Buildings

Contractor to furnish and install:

- Diesel / Demin Forwarding Pump Shed
- Firewater Pump building
- Gas Compressor building
- Office, Control Room,
- Maintenance and warehouse building.

2.8 Plant Equipment Erection

- Contractor to unload all Plant equipment delivered to site.
- Contractor will provide all cranes and support equipment and manpower as required to erect the gas turbine generators.
- Contractor to provide for erection of all BOP equipment.

2.9 Cranes, Equipment and Tools

Contractor to furnish or provide for all plant construction required cranes, fork lifts, back hoes, hydraulic lifts, welding machines, air compressors, generators, temporary lights, trucks, pick-ups, etc.

2.10 Transportation

Transportation of equipment is not included in the Contractor's scope at this time. Owner is responsible for contracting for transportation of equipment.

2.11 Lubricants and Chemicals

- Contractor will supply and install all lubricants, lube oils and chemicals for furnished equipment.
- Contractor to supply and install non-PCB oil for GSU transformers.

2.12 Spares

- Contractor will make provision to supply, receive and store all commissioning spare parts furnished for equipment during start-up and commissioning.
- Contractor to provide Owner with recommended list of spare parts for Gas Turbine Generator and BOP equipment.

2.13 Construction Offices and Storage Facilities

- Contractor to provide construction offices for Contractor, Technical Representatives (3), and Owner.
- Owner to provide 3 acre lay down area and site for construction offices and construction utilities (electrical and potable water)
- Contractor to provide fenced storage and a lay down area and around the construction site during construction.
- Contractor to provide sanitation facilities for Contractor, & Owner personnel during construction.
- Contractor to provide communication facilities for construction.

2.14 Engineering and Project Management

- Contractor to provide detailed engineering and specifications for all disciplines involved for the power plant including civil and concrete foundations.
- Contractor to provide project management complete with construction management, quality control / quality assurance, scheduling, administration, warehousing, and expediting including regular monthly reporting of all disciplines.
- Contractor to arrange for and provide fully qualified technical representatives during erection, testing, start-up, commissioning for the gas turbine generator units and Chillers.
- Contractor to provide startup, commissioning and testing of BOP associated systems.
- Contractor to provide operator and maintenance training for Power Plant on the Gas Turbine Generator Packages and Balance of Plant.
- Contractor to provide one (1) electronic and two (2) hard copies in English and Spanish of the O&M manuals, training manuals, engineering calculations, commissioning and start-up manuals, test manuals, as-built drawings, design specifications and warranty manuals for plant equipment.

2.15 Cathodic Protection

Cathodic Protection will be provided for all steel underground piping.