Invitation For Multi-Step Bid

No. GPA-048-04

PERFORMANCE MANAGEMENT CONTRACT

FOR THE

GUAM POWER AUTHORITY
CABRAS UNITS #3 AND #4
SLOW SPEED DIESEL POWER PLANT

Volume III

Plant Technical Description

JULY 2009

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1. Introduction

1.1. Purpose

The purpose of this Technical Description is to provide technical information about the Cabras Units 3 & 4 generating station to prospective BIDDERs of the Performance Management Contract (PMC) solicitation.

This document provides general information on the plant's design, historical performance, operation, maintenance activities, future maintenance, capital requirements and condition assessment. The technical description of the Cabras 3 & 4 Plant relies upon the input from experienced and knowledgeable plant, corporate and support personnel.

The information contained in this Technical Description is the Guam Power Authority's best effort at organizing, documenting and describing the overall condition of the plant equipment. All efforts have been taken to represent the status of the plant as accurately as possible to the prospective proponents.

However, although every effort has been taken to represent the plant's condition in a fair manner, not every item or actual condition of some equipment can be represented in this document.

1.2. Assumptions and Scope

The review of the description, history and condition of the station and its major equipment and systems was accomplished by reviewing documentation and conducting interviews with key plant and support personnel. The review included but was not limited to an assessment of the plant's design and layout, capacity, system redundancy and equipment operations and maintenance (O&M) history.

Historical performance indicators regarding capacity, reliability, availability and heat rate were reviewed based on reports by the current PMC. Key station description, historical and condition assessment documents, drawings and procedures were reviewed to gain insight to the plant's overall condition.

The historical documentation of equipment and systems reviews was not intended to be all inclusive, but rather to provide a reasonable perspective of the operating and maintenance history of the plant. The technical review is intended to be a factual description of the facility and refrains from offering conjecture or opinion, except where clearly identified. It is assumed that prospective proponents of this PMC will conduct their own verifying due diligence effort.

1.3. Station Description

The Cabras 3 & 4 station is wholly owned and operated by the Guam Power Authority. GPA completed construction and commissioned Cabras Unit 3 in 1995. Cabras Unit 4 is a mirror

design to Cabras Unit 3, and was commissioned in 1996. Both units are rated at a 39,300 kW gross output capacity.
The plant's prime movers are type 12K80MC-S Low Speed Diesel Engines manufactured by Hanjung, Korea Heavy Industries under license from MAN B&W. The 12 cylinder, in-line, two-stroke engines are rated at 55,060 BHP and 102.9 RPM. The units burn #6 medium and high sulfur fuel oil and can also operate on #2 diesel at startup and shutdown.

The generators are ABB SA, type W.950/95/70 units manufactured in Spain. The generator sets are rated at 49,280 KVA, 0.8 PF, 13.8 KV, 2,062 AMPS. The unit has 70 air-cooled poles wye configured.

In January 1, 2005, GPA began a Performance Contract Management with Doosan Engine Co., Ltd. (previously HSD Engine Co., Ltd.) for the purpose of providing private management resources and benefits to Cabras 3 and Cabras 4. The contract objective was to improve the overall performance of the units with regards to operations, maintenance, efficiency and reliability.

1.4. General Assessment

The plant was equipped with equipment from reputable equipment manufactures located in Asia and Europe. Asian and European manufacturers provided the balance of plant equipment typical for the direct support of the prime mover, generator, and station auxiliary equipment such as coolers, compressors, and regulators. U.S. based firms were contracted to provide equipment typical for power distribution such as transformers, switchgear, and motor control centers (MCCs). This is likely due to the 60-Hz frequency requirement typical to the island. The vast majority of the equipment is still serviceable by the respective OEM's but non-OEM suppliers have been identified during the service life of the power station that can provide suitable replacement components. HSD Engine has provided the balance of all parts and materials to support the engine preventive and corrective maintenance requirements. GPA has successfully solicited from local vendors and suppliers the delivery of parts and materials for various engine auxiliary components.

Due to the excellent heat rate of the Cabras Low Speed units they are considered high in the economic dispatch order. Thus Cabras 3 & 4 units are planned for block load operation above 60% MCR to meet the needs of the GPA system dispatch. System requirements will dictate all generation dispatching and at times may require the units to be secured in accordance with the instructions of the Power Systems Control Dispatcher. All efforts would be put forth to maintain operation of the units at no less than the capacity necessary to operate the plant homogenizers in accordance with the Air Permit to Operate requirements.

1.4.1. Pre- PMC Period

The list below provides the highlights of the repairs undergone by the two units prior to entering a performance management contract:

Cabras Unit 3

- On February 6, 2002 an explosion and fire originated in the crankcase of the Cabras Unit 3 low-speed diesel engine shortly after 8:30 a.m.
- Investigation and analysis of the incident determined that the blast originated inside the crankcase of the #10 cylinder.
- The blast and fire caused significant damage to the main building and various auxiliaries.
- The thrust of repairs were made to address fire and blast damage to the main engine.
- Architectural repairs and decontamination of the building, control room, electrical switchgear, and motor control center were made due to the blast originating in the main crankcase area.
- Startup of the Unit occurred on October 19th, 2003 with running in and commissioning of the engine still on-going, anticipated to be completed in February 2004.
- GPA has also invested in the upgrade from type E to type D on the ABB VTR 713 turbochargers for this unit.
- The turbochargers on Cabras 3 were commissioned in January 2004.

Cabras Unit 4

- Cabras Unit 4 experienced a heavy fuel oil fire on August 4, 1999, that resulted in a significant amount of damage and a lengthy forced outage.
- The fire originated in the Unit 4 fuel oil heater room due to a failure in a four-section heater assembly.
- The section involved in the fire was the #4 heater (highest temperature of the chain) which ruptured due to heat and internal pressure of the ~1/4" steel shell. Damage was sustained in the main engine hall to the auxiliary equipment and fuel heater room.
- GPA has also invested in the upgrade from type E to type D on the ABB VTR 713 turbochargers for this unit.

The plant is fired on heavy oil, and may light off with #2 diesel. Both high and low sulfur oils are burned. The low sulfur oil has been used as high as two-quarters of the year based on environmental conditions and maintenance issues, which dictate the switching of fuels to mitigate environmental issues.

Waste oil byproducts from the fuel and lube oil cleaning purifiers at Cabras 3 & 4 as well as Enron 8 & 9 are handled and burned at Cabras 1 & 2. The oil quality should be tested and documented by local testing companies quarterly prior to discharge into the Cabras Waste Oil Facility. Currently, the Cabras 1 & 2 Steam Power Plant is the only plant on the island capable of burning this waste stream byproduct.

Major design modifications and upgrades are:

- **Continuous Emission Monitoring System (CEMS)** mandated by Air Permit to Operate, United States Environmental Protection Agency

- Integration of Number 6 oil handling equipment to facilitate **automatic switching from high to low sulfur oil** when the environmental conditions require the use of low sulfur fuel
- **Waste oil facilities upgrades**
- **Upgrade from Type E to Type D on the ABB VTR 713 Turbochargers**
- **Replacement of Distributive Control System Workstation Hardware**: The Bailey Workstations were replaced with ABB Bailey Computer-Based Workstations due to the unavailability of parts to support the repair of the workstations after the Cabras 3 Fire Incident. The upgrade from OIS25 SCADA Monitoring system to computer based HSI Console Monitoring System was completed in late November 2003.
- **Engine Modification – Piston Cleaning Ring**: GPA is currently in the initial stages of implementing the Piston Cleaning Ring design modification to the pistons and cylinder liners specifically in increase the mean time between overhauls for each cylinder.

1.4.2. PMC Period (FY 2005 to present)

The list below provides the highlights of the repairs and major improvements and modifications undergone by the Cabras 3&4 Plant during the performance management contract period from January 2005 to date:

- **Cabras 4 Crankcase Fire Incident**. In May 2007, Cabras Unit #4 experienced catastrophic equipment failure due to Main Bearing Failure and Crrankcase fire incident. The cause of the failure of the bearing is due to the increased roughness of the #11 journal possibly brought on by either deteriorated oil quality, dislodged white metal fragments or corrosive attack of the oil on the journal surface. The Resulting damages included the following:
    - Damages to the #11 Main Bearing, Crankshaft Journal and Main Bearing Support Saddle;
    - Blowout of crankcase door #1;
    - Fire Damage to crankcase door#2;
    - Damage to the Cabras 4 Air Duct;
    - Slight Damages to #10 and # 12 Main Bearing Shells
    - Fire Damage to #1 and #2 Alpha Lubricators
    - Damage to Acousting Celilings of C3 3rd and 4th Elevator Lobby
    - Damage to Cabras 3 Side Power House Air Vent
    - Disintegration of Cabras 4 Turbocharger Air Filters #1, 2 and 3

  Subsequent restoration efforts were done up to October 2007. Modifications to the standard existing equipment were completed to provide additional safeguards against recurrence of incident. The modifications include:
    - Retrofitting of Cabras 4 engine with a new Bearing Temeperature Monitoring System to allow operators to monitor real time and trend temperature conditions, as well as provide automatic emergency shutdown of the engine when temperatures exceed 70°C.
    - Reprogramming of the alarm system to automatically shutdown engines in the event of an oil mist alarm.

- **Installation of a Reverse Osmosis System**. In 2005/2006, a new Reverse Osmosis System was installed to provide the plant with emulsion water, thus eliminating the plant's dependence on Cabras 1&2 for condensate water supply. Water previously supplied by Cabras 1&2 plant meets a higher quality standard than required which also equates to higher costs. The installation of the RO System provides the plant with water that meets the required standard with decreased operational costs.
- **Seawater Pipeline Replacement**. The existing sea water pipeline, which was already experiencing heavy corrosion, was a critical weak point in plant operations. Replacement with High Density Polyethylene Pipe, which was corrosion-resistant, resolved the issues encountered.
- **Alpha-Lubricator Retrofit**. Retrofitting Cabras 3&4 Engines with new Alpha Lubricators (electronically-timed cylinder oil injectors) which injected oil directly into piston rings at high pressure saved up to $350,000.00 per year in cylinder oil costs.
- **Modification of Shock Absorbers**. Redesigned the existing shock absorber springs with new material, which increased runtime between failures and reduced ordering requirements.
- **Installation of 750kW Generator**. Installation of a permanent 750kW Generator for emergency use to keep critical plant equipment running during blackout situations.

1.4.3. Major Auxiliary and Support Systems Redundancy

Sufficient redundancy in its major auxiliary and support systems to meet the operating requirements of the stations are indicated below in Table 1.

The Cabras 3 & 4 generating station offers challenging opportunities in relation to the required operation and maintenance activities inherent in a non-interconnected, island electric generating environment. In general, the plant has a good mix of quality equipment and solid OEM relationships.

Table 1. Major Auxiliary and Support System Redundancy

Equipment Description	# Of Normal Operating	# Of Spares
Fuel Oil Purifiers	2	1
Fuel Oil Supply Pumps	2	1
Air Compressors	2	1
Diesel Oil Pumps	1	1
Fuel Oil Feed Pumps for Purifiers	2	1
Fuel Oil Circulating Pumps	2	2
Fuel Oil Sludge Pumps	2	1
Main Lube Oil Pumps	2	2
Camshaft Lube Oil Booster Pumps	2	2
Cylinder Oil Transfer Pumps	2	1
Cooling Water Circulating Pumps,	2	2
Jacket Water Pumps	2	2
Sea Water Pumps	2	1

2. Site Description and Characteristics

2.1. General Location

The Cabras Units 3 & 4 power plant is located on the island of Guam. Guam is the largest and southernmost island of the Marianas archipelago. The westernmost possession of the United States since 1898, the island is at 13.48° north latitude and 144.45° east longitude. Guam is approximately 1,500 nm southeast of Tokyo; 2,100 nm southeast of Hong Kong; 1,500 nm east of Manila; and 3,100 nm northwest of Sydney; 6,000 nautical miles (nm) west of San Francisco; 3,700 nm west-southwest of Honolulu.

The island is composed of both volcanic material and limestone base seabed material from coral deposits.

Guam's climate is tropical marine; generally warm and humid, moderated by northeast trade winds. Guam's temperature ranges between 73 and 90 degrees Fahrenheit (23 and 32 degrees Celsius). It has a mean annual temperature of 81 degrees (27 degrees C). May and June are the hottest months of the year. However, there is little seasonal temperature variation.

The coolest and least humid months, December through February, are marked by prevailing westerly trade winds. The average humidity varies from an early morning high of 86% to an afternoon low of 72%. The high moisture content of the atmosphere during the rainy season, combined with the warm temperatures, contributes to the rapid deterioration of manufactured materials through rust, rot and mildew.

The average yearly rainfall ranges between 90 and 110 inches (229 and 279 cm). There are two seasons, the dry and the rainy. The dry season (fanumnangan) lasts from December through June. The rainy season (fanuchanan) prevails within the remaining months. Guam's subterranean water lens supplies fresh water far in excess of the island's present needs.

2.2. Site Location and Description

The Cabras generating station is located on the west central side of the island of Guam in Piti, Guam on a landfill over what was Cabras Lagoon and Cabras Island. The plant is accessible from Route 1 and is located on the main road to and from the island's only commercial shipping seaport.

The remainder of the Cabras site has the Units 3 & 4 and their associated common structures. Oil storage tanks for Cabras 3 & 4, Central Maintenance facilities, Generation Engineering support, Central planning support, Waste Oil processing facility, Central Laboratory Building, Units 1 – 4 Switchyards, Central Parts Inventory and System Dispatch Center are also located on the same property.

2.3. Transmission Line Interface

The power plant is interconnected to the GPA transmission network via four 115kV transmission lines:

- Cabras-Agana 115 kV Line #1;
- Cabras-Agana 115 kV Line #2;
- Cabras-Piti 115 kV Line;
- Cabras T-300 115/34.5 kV Interchange Transformer

The vast majority of the power produced on the island is at the Cabras-Piti Complex. Out of a total installed gross capacity of 555.4 MW, 340 MW is sited at the Cabras-Piti Complex. Other peaking combustion turbines and black start diesels are strategically located through out the island and interconnected via various high voltage transmission lines.

Each of the plants' units is protected by an existing generator unit-tripping scheme. This scheme will trip each unit as required to prevent instability of the system as well as overload conditions.

2.4. Community

The island has a population of approximately 156,000 people excluding tourists. Tourism, the number one business of Guam, adds approximately 15,000 people to the island's total at any given time.

The United Stated military has a presence on the island. The Andersen Air Force base is located at the island north end. The US Navy has a small operation only two miles from the Cabras site. The United Stated military has proposed to relocate 8,000 marines plus families to Guam increasing the military presence on the island.

The US Navy recently turned over the operation of the shipyard to a private contractor. The private contractor has a multi-year contract to operate the shipyard, primarily in support of the Navy ship repair. This facility has a tremendous variety of maintenance equipment and capabilities as would be expected of a remote ship repair facility. This facility if utilized properly could be a strategic asset to the PMC contractor in that maintenance alliances and services may be developed to support various aspects of the facilities maintenance needs.

The station personnel are government employees. The employees earn vacation based on time worked and seniority.

Employees are active with the following community affairs: Liberation Day (GPA sponsored float in parade), Labor Day Government of Guam Picnic, Military Reserves, GPA Public Power Week and associated island wide clean-up activities. GPA sponsors *Fitness & Wellness* program where an employee can use three hours of the normal base 40 hours each week to exercise and receive normal pay. Employees are encouraged to support various community activities such as government-sponsored programs, parades and events such as the recent South Pacific Games held on Guam in 1999.

A variety of local vendors supply important services to the site as follows:

- Rental Equipment;
- Electrical and Mechanical Parts;
- Various Tools and Consumable Materials;
- Janitorial Services;
- Welding and Machining Supplies;
- Hardware Supplies;
- Construction Equipment;
- The Former US Navy Shipyard Maintenance Facilities with Machining and Repair Capacity.

2.5. Site Map

Site maps will be provided upon request.

2.6. Site infrastructure

2.6.1. Utilities

The station's utilities include potable water, electric power, communications and sewage discharge lines.

2.6.1.1. Domestic Water

Domestic potable water is provided to the site by the Guam Water Works Authority through a cooperative agreement by the US Navy reservoir located near by. This source of water is used for the Reverse Osmosis System for the production of the plant's water needs. The same water supply charges the fire hydrants on the plant property. No plant booster pumps are required. Domestic potable water is also used in areas of the plant where the closed cooling water system cannot meet the flow requirements.

2.6.1.2. Station Electrical

The system consists of generators, power transformers, HV switchgears and Bus Ducts, MV Swithcgears and station auxiliaries such as 480 V Load Centers, 480 V Motor Control Centers (MCC) and other facilities. The systems for Cabras No. 3 & 4 are basically divided into three major sections; Cabras No. 3 Facility, Cabras No. 4 Facility, and Cabras No. 3 & 4 Common Facility. Additionally, a provision has been established to provide emergency backfeed from the Cabras No. 1 & 2 Common Auxiliary Board.

2.6.1.3. Generator

The generators provided for each unit are of the salient pole type with static thyrister excitation and totally enclosed, internally air cooled type. Heat transfer is accomplished by closed cooling water system with air to water heat exchangers. The major equipment associated with each generator are the Lineside Cubicles, and Neutral Grounding Cubicles located on the second floor of the plant in the main engine hall in front of the main generator unit. The Automatic/Manual Voltage Regulator is located on second floor in the Medium Voltage Switchgear Room.

Each Generator is rated as follows;

- 13.8 KV Rated Voltage
- 102.9 Rated RPM
- 49,200 Rated KVA
- Power Factor 0.8 Lagging
- Frequency 60 Hz
- 3 Phase Wye
- Grounding Transformer with Secondary Resistor
- Short Circuit Ratio > 0.8
- Voltage Regulation: +/- 5%
- Excitation: Static Thyrister (Brush Type)

The Generator Protection Panel is located in the Main Control Room on the fourth floor. The panel protective devices are as follows:

- Overcurrent (50/51)
- Generator Earth Fault (59N)
- Generator Differential (87G & 87 GT)
- Under/Over Voltage (27 / 59)
- Reverse Power (32)
- Loss of Excitation (40)
- Overexcitation , V/Hz (59 OF)
- Over/Under Frequency (81 O/U)
- Negative Phase Sequence (46)
- Exciter Earth Fault (64 F)
- Exciter Overvoltage (59F)

2.6.1.4. Transformers

The station is equipped with the necessary transformers to step up the voltage from the rated terminal voltage of the generator (13.8 KV) to the transmission level of the Cabras Switchyard (115 KV). Additionally, transformers to step down the voltage to the usable levels for house power in the station (4.16 KV, 208 V, & 120 V) are installed.

In summary,

- Two 13.8 kV/115 kV step-up main transformers (East and West);
- Two 13.8kV/4160 V unit auxiliary transformers;

- Eight 4160 V/480 V power center transformers.
- One 480 V/120/208 V Lighting Transformer

Table 2 contains a description of the aforementioned transformers.

Table 2. Cabras 3 & 4 Plant Transformers

Name	Location	Quantity.	Input Source	Input Voltage	Output Voltage	Equipment	Historical Maintenance Record
54 Main Transformer	Outside Building Perimeter	One transformer per unit	Generator	13.8 kV	Stepped up to 115 kV	Provides power to IWPS on 115 kV East and West Buses	Maintenance performed by T&D substation.
56 Auxiliary Transformer	Outside Building Perimeter	One transformer per unit	Generator	13.8 kV	Stepped down to 4160 V	Provides Station Power to plant and to Power Center Transformer	Maintenance performed by T&D substation.
58 Potential Transformer for Generator	2nd Floor—High Voltage Switchgear Room)	Reference Single Line Diagram	Generator	13.8 kV	Stepped down to 120 V	Generator controls: Wattmeter, Variance, and Watt-hour meter.	Maintenance performed by PIE Section Cabras 3&4
69 Power Center Transfer	Operation Floor	Eight (Cabras unit #3, #4, and Common)	Auxiliary Transformer	4160 V	Stepped down to 480/277 V	480 Power Centers	Maintenance performed by PIE Section Cabras 3&4
69 Lighting Transformer	3rd Floor Medium Voltage Switchgear Room	One Common	Auxiliary Transformer	480 V	Stepped down to 120/208 V	Lighting Panels	Maintenance performed by PIE Section Cabras 3&4

The two 13.8 kV/115 kV step-up transformers, one for each unit, serve to export power out of the Cabras 3 & 4 power plant. These units are 60 Hz, oil immersed transformers of 37.5 MVA/50 MVA OA/FA with no load tapchangers of 2.5 % above and below normal on the High Voltage Windings. The major characteristics of the transformers are as follows:

- Type: 2 Winding, 3 Phase
- Impedance: Approximately 9% on 37.5 MVA
- Vector Group: Ynd 1 Solidly Grounded
- BIL: HV Winding 550 KV Crest, LV Winding 110 KV Crest, HV Neutral 350 KV Crest

The two 13.8 kV/4.16 kV unit auxiliary transformers, one for each unit, provide the source of power to serve house loads to operate the power station auxiliary equipment. These units are 60 Hz, oil immersed transformers of 3.75 MVA/5 MVA OA/FA with no load tap-changers of 2.5 % above and below normal on the High Voltage Windings. The major characteristics of the transformers are as follows:

- Type: 2 Winding, 3 Phase
- Impedance: Approximately 9% on 37.5 MVA
- Vector Group: Ynd 1 Solidly Grounded
- BIL: HV Winding 550 KV Crest, LV Winding 110 KV Crest, HV Neutral 350 KV Crest

The transformer protection panel is located in the main control room adjacent to the Generator Protection Panel. The panel is manufactured by ABB with the following relays installed:

- Transformer Neutral Grounding (51NT)
- Transformer Differential (87 T)
- Oil Temperature (26 O)
- Winding Temperature (26 W)
- Buchholtz Relay (96 B)
- Pressure Relief (96 D)
- Sudden Pressure (96 P)
- Oil Level (33Q)

2.6.1.5. H.V. Switchgear & Bus Duct

The H.V. Switchgear provided at the station is manufactured by Golden Gate Switchgear Co., and rated at 13.8 KV. The SF6 Gas Circuit Breakers (Square D) are maintenance free and are connected to the generator and transformers via the segregated phase bus duct. The Generator Circuit Breaker and Unit Transformer Circuit Breaker are rated at 15 KV, 31.5 KA, and 2500 A and 1200 A respectively.

The Segregated Phase Bus Duct (SPB) is manufactured by CPC Systems (Technibus). It is suitable for both indoor and outdoor application with no potential transformers, current transformers, or surge arrestors located in the middle of the SPB. The current carrying capacity of each section is as follows:

- Generator Terminal to Breaker 2500 A
- Generator Breaker to Step Up Transformer 2500 A
- Generator Breaker to Unit Transformer 1200 A

2.6.1.6. Medium Voltage Switchgear

The medium voltage switchgear (3SW01, OSW01, and 4SW01) provided at the plant are of metal clad construction, in-door, fully withdrawable, with vacuum interrupter type breakers. The bus is rated at 5 KV, 1200 A and are fully controllable from the Plant Control Room. Paralleling and interlocking features are provided to allow for alternative supply from either unit as well as from the Cabras Unit No. 1 & 2 Common Bus. Generally, the switchgear is equipped with the following protection relays:

- Over-current 50/51
- Neurtral Ground 51 N
- Under/Over Voltage 27/59
- Ground 50 G
- Differential 87
- Thermal 49
- Phase Balance 46

2.6.1.7. 480 V Load Centers and Motor Control Centers (MCC)

Each load center is directly coupled to a silicone filled 4.16KV/480 V Step Down Transformer. The indoor type switchgear is equipped with fully withdrawable air circuit breakers feeding the various Motor Control Centers (MCCs) throughout the plant. Load Center Bus ratings range from 4000 AF to 800 AF. The 480 V Load Centers are located in the third floor of the main building and on the second floor of the Emulsion Water House adjacent to the Electric/Instrument Shop.

The Motor Control Centers are NEM Class II Type B construction. All motors smaller than 251 HP are controlled at this level. Additionally, any load requiring uncontrolled 480 V power supplies and welding receptacles are terminated to these switchgear.

2.6.1.8. Station Lighting

The Station Lighting Panel that supplies power to all interior lighting and outside lighting is located on the 3rd Floor Medium Voltage Switchgear Room, adjacent to the employee lounge area.

From the main and the individual breakers, the circuits branch out to various smaller breaker panels scattered throughout the plant.

2.6.1.9. Emergency Generators

A permanent 750 kW Generator has been installed in the plant for emergency use to keep critical plant equipment running during blackout situations.

2.6.1.10. DC Batteries

DC batteries provide 125 VDC (100 Amps) power via the 125 VDC distribution bus panel located on the mezzanine floor (2nd Floor, Medium Voltage Switchgear Room).

DC Battery systems consist of three battery banks, one per unit, and one standby system. GNB Absolute II was the supplier of the battery system. The ampere-hour rating is based on an eight-hour discharge rate of 1.75 volt per cell at 25 degrees Celsius (77 degrees Farenheit). These batteries are operated to float between 2.25 to 2.28 volts DC per cell.

Each battery charger is equipped with silicon rectifier, transformer and automatic voltage regulator to maintain regulated output charge. Chargers have sufficient capacity to carry normal continuous DC loads and to recharge station batteries within 24 hours from a completely discharged condition when operating with one charger out of service. DC chargers are capable of floating or equalizing charge operation for ease of maintenance.

2.6.1.11. Communications System

The plant is equipped with both telephones and a Gai-Tronics paging system. Handsets and loudspeakers are furnished throughout the plant to permit either conversation on the handset stations or calls over the public address speakers. Handsets are wall mounted in the powerhouse and with several desk type units in the offices. Selector switches are available to permit either station-to-station or public address communication.

2.7. Incident Mitigation Capabilities

The plant has a series of Standard Operating Procedures (SOP) which are employed GPA wide. The following SOP's pertain to these issues:

- SP-049 Tropical Cyclone Emergency System Restoration (ESR);
- SP-050 Oil Spill Containment, Clean-up and Reporting;
- SP-057 Supplements I through VII to the Hazard Communication Program;
- SP-063 Hazard Communication Program;
- SP-067 Employees Hazard Reporting;
- SP-088 Emergency Condition (Support Services Section).

2.8. Fire Hazard Mitigation

2.8.1. Station Fire Protection System Descriptions

Fire alarm and protection systems consist of yard and indoor fire hydrants and several CO2 extinguishing systems.

2.8.1.1. Fire Pumps

The fire pump is a vertical electric driven "Jockey pump" designed to maintain system pressure. The pump is rated at 380 Lpm at 65 m discharge head. Grinnel Corporation manufactured the pump.

2.8.1.2. Hydrants and Piping

The Cabras facility is equipped with a variety of permanently installed fire hydrants. Most fire hydrants are located around the perimeter of the facility by the access roads. The fire hydrants are tied to the Guam Water Works Authority water system.

2.8.1.3. Carbon Dioxide (CO2) Extinguishing Systems

The plant is equipped with a fixed automatic CO2 total flooding systems designed to protect the control room (sub-floor only), low and medium voltage switch gear rooms, fuel/water treatment switchgear room, engines' scavenge air space, battery room and cable spreading room. The systems are designed for automatic or manual actuation. The systems are activated automatically by photoelectric type smoke detectors.

2.8.1.4. Locally Mounted Fire Extinguishers

Fire extinguishers are located in the battery room, control room and in various locations throughout the plant and on the engines.

2.8.1.5. Spray Nozzles

Spray nozzles and hose reels are located throughout the plant. No automatic fire sprinklers or sprinkler heads are part of the facility.

2.9. Security Operations

The GPA security department protects the plant and other locations and is responsible for:

- Station access and control (Provided through the Port Authority and GPA);
- Emergency incident and alarm response;
- Incident investigation;
- Station vehicle and locker control.

2.10. Support Structures and Facilities

This section provides a description of the following support facilities:

- Central Maintenance
- Peripheral facilities
- Power System Control Center
- Central Laboratory Facility
- Cabras 3 & 4 Slow Speed Diesel Plant
- Warehouse operations
- Generation Administration, Engineering and support offices
- Parts inventory storage

Approximately 22 personnel are assigned to the Central maintenance group, approximately one or two are assigned to the central lab and approximately 12 are assigned to the Central dispatch center. One person is assigned to the warehouse operation, two assigned to the waste oil facility and 35 are assigned to the Cabras 3 & 4 facility. At any given time contract and support personnel

can be located on site in support of unit overhauls, construction, upgrade or maintenance related projects.

2.11. Intake and Discharge Channels

GPA constructed the approximately 30 feet wide and 10 feet deep intake channel. The intake channel inlet runs from the west side of the Cabras Island, under the port and plant access road to the inlet of the traveling screens. Dredging was last performed in 1993. This activity will continue to be the responsibility of GPA in that Cabras 3 & 4 shares the intake channel with the Cabras 1 & 2 Power Plant.

2.12. Emission Monitoring and Reporting

2.12.1. Continuous Emission Monitoring System (CEMS)

Cabras 3 & 4 uses a Q-Series CEMS system provided by Emission Technology Inc., (ETI) to monitor nitrogen (NOx) and oxygen (O2) in stack gas emissions. The system consists of a sample probe and primary filter assembly, a sample line, an analyzer and a computer. Currently, there is a contract for the maintenance of the system.

2.12.2. Water Discharge Monitoring and Reporting

Guam Power Authority is mandated to comply with the Clean Water Act (33 U.S.C. 1251 et seq., the "Act"). This requires GPA to apply for environmental permits for water discharge from the Cabras 1 – 4 power plants into the Piti Channel, Apra Harbor. This involves considerable work with effluent limitations, monitoring requirements, other general conditions and conditions under EPA Region IX Standard Federal National Pollutant Discharge Elimination System (NPDES) Permit Conditions. GPA presently holds permit number GU0020001. This permit became effective on January 30, 2001 and expires January 30, 2006.

Effluent limitations are applied to cooling water and storm water discharge. GPA Cabras 3 & 4 lab personnel conduct monthly monitoring and sampling for flow, temperature at receiving water and influent/effluent areas, fluoride and pH. A third party contractor provides sample testing.

Limits for cooling water discharge require the temperature change of the received water to not exceed 1.0 degree C. on a daily and average monthly basis. Fluoride must not exceed 1,350 kg/day or 1.5 mg/l per day. The pH of the effluent shall not be less than 7.0 standard units or greater than 9.0 standard units and shall be within 0.5 standard units of natural conditions at all times. Other than pH, which is monitored weekly, all other characteristics must be monitored on a monthly basis, sampled by the plant and taken to a contracted testing company.

Storm water discharge is monitored and sampled for flow, suspended solids, oil and grease, fluoride and pH by GPA Cabras 3 & 4 plant personnel. Like cooling water discharge, samples for storm water are also tested by a contracted testing company, presently Raytheon. Limitations include suspended solids not to exceed 50 mg/l per day; oil and grease shall not exceed 20 mg/l

per day and 15 mg/l on an average monthly basis. The pH levels shall have the same limits as the cooling water discharge. GPA is also required to continue the Water Quality Monitoring Plan for thermal discharge, which was a previous requirement to the additional discharge due to the operation of Cabras 3 & 4.

Other general conditions ensure other pollutants are not released through the plant discharge. These conditions restrict discharge from being unaesthetic, detrimental to or adversely affect aquatic life, and /or toxic or harmful to humans, animals, plants or aquatic life. There is no allowance for discharge of polychlorinated biphenyl compounds or chlorine.

Under the permit conditions GPA must also monitor low-volume waste monthly for oil and grease, conduct quarterly toxic testing of organisms exposed to the effluent, and develop and implement storm water "Best Management Practices" (BMP), plan. The permit does include guidelines for testing, required BMP's, non-compliance reporting procedures, as well as remediation requirements.

Toxicity sampling and analysis is contracted to Environmental Monitors, located in Maina, Guam. All sampling and testing contracts are handled by the Cabras power plant. All monitoring, sampling and testing reports for Cabras 3 & 4 are sent to GPA Planning and Regulatory Section, for the submittal of the monthly and quarterly compliance reports to both EPA and Guam EPA.

3. Process & Equipment Description

Initial operation of the Cabras generating station unit 3 & 4 began in 1995. Each unit is rated at 55,060 BHP net or 39,300 KW gross output. The plant is situated on a small track of land on the islands west central side. The following is a description of the plant's major equipment, systems, major historical events and brief and general condition assessment of the equipment.

3.1. Engine and Related Systems

Description of equipment and system: The Hanjung-Man B&W engines are 12-cylinders, in-line, 2-stroke cycle, low speed diesel units. They operate at 102.9 rpm, with 30 bar g starting air pressure. Each piston has a 2300 mm stroke with an 800 mm bore. The units burn #6 medium and high sulfur fuel oil and can also operate on #2 diesel at startup and shutdown. Each unit is equipped with three (3) ABB turbochargers, which supply 0.3 bar g of scavenged air drawn from within the building to the engine.

GPA performs preventive maintenance work on each unit for the 2000 operating - hours scheduled maintenance every year.

3.1.1. Generators

The generators are ABB SA, type W.950/95/70 units manufactured in Spain. The generator sets are rated at 49,280 KVA, 0.8 PF, 13.8 KV, 2,062 AMPS. The unit has 70 air-cooled poles wye configured.

3.2. Fuel Supply

3.2.1. Heavy Oil Storage and Transfer System

Description of equipment and system: Both Cabras 3 & 4 are operated using light oil (#2-diesel) and heavy fuel oil (#6 – Bunker C). The light oil is used during start-up only for cold engine and more than 5 days engine shutdown.

The diesel oil is transferred from the existing Cabras Units 1 and 2 50,000-gallon ignition storage tank to the plant. Diesel oil was previously used to start-up the units, however , this has been changed and diesel oil is now used to flush the fuel oil piping prior to start. The heavy fuel oil is used to start up the units.

The high sulfur heavy fuel oil is transferred from the 430,000-barrel tank (#1902) at the Shell yards to the 250,000 – barrel storage tank (#1935) once a month and the low sulfur heavy fuel oil is pumped directly from the ship (F1 dock) to the 250,000-barrel storage tank (#1934) about every two months.

These two storage tanks are located at the GPA tank farm, approximately one mile east of the plant, and are maintained and operated by a contractor (Peterra Corp.). From there, the fuel oil is

pumped to the two (2) 1,600,000 –liter Cabras 3 and 4 day tanks on a daily basis. This is where the oil is metered locally using the Gruppo Isoil positive displacement meter and by the Seojin level gauges. The meter totalizer readings and the gauge level readings are monitored in the control room.

Electric heaters located in the suction of the storage tanks heat the oil. The oil is pumped to three Alfa Laval self-cleaning fuel oil purifiers to remove solid and liquid contaminants and then transfer to two (2) 122,000-liter fuel oil service tanks. From there the oil is pumped to the Reson System ultra-sonic homogenizers where it is emulsified and then transferred to the plant. In the plant, fuel oil is reheated again by electric heaters and filtered again through engine inlet filters before it goes to the engine.

The actual fuel oil consumption of the engine is measured or metered by the Brooks oval gear meter located before the homogenizer. The totalizer readings from this meter are monitored in the control room.

3.2.2. Fuel Oil Storage and Transfer Equipment Description

Description of equipment:

Fuel Oil Storage Tank – The plant has 2 outdoor C.R.T. type**,** 1,600,000 - liter tanks. The tanks are approximately 13.5 m in diameter and 12.8 m high. Jung Poong, of Korea, manufactured the tanks.

Fuel Oil Service Tank – The plant has 2 outdoor C.R.T. type, 55,000 – liter tanks. The tanks are approximately 4.25 m in diameter and 4.5 m high. Jung Poong, of Korea, manufactured the tanks.

Fuel Oil Supply Pumps – One Leistritz model L3MG-52/104-AHOKI-G screw pump per unit with one spare pump. The pumps have a capacity of 10.2 CMH at 14.5 bar. 13 kW, 460 volt, 1752 rpm motors drives the pumps.

Diesel Oil Supply Pumps – Both units are equipped with two diesel oil supply pumps, type L3MG-60/96 AHOKI-G, manufactured by Leistritz . The capacity and pressure is 10.2 CMH and 14 bar, while 9.0 kW, 460 volt, 1720-rpm motors, drive the pumps.

Fuel Oil Circulating Pumps – Two Leistritz model L3MG-70/112-AHOKI-G screw pumps are on each unit. The pumps have a capacity of 21.3 CMH at 6 bar. 13 kW, 460 volt, 1752-rpm motors drives the pumps.

Fuel Oil Feed Pumps for Purifier – Both units are equipped with three fuel oil feed pumps for the purifiers, one duplex type and another single type pumps, manufactured by IMO. The pumps have a capacity of 9.6 CMH at 4.4 bar. 3.5 kW, 460 volt, 3500-rpm motors drives the pumps.

Fuel Oil Return Pumps – One Leistritz model L3ME-25/35-AHOKI-G screw pump is on each unit. The pumps have a capacity of 0.6 CMH at 13 bar. 0.9 kW, 460 volt, 1713-rpm motors drives the pumps.

Fuel Oil Feed Suction Filter – Both units are equipped with one fuel oil feed suction filter, duplex type, manufactured by Jeong Woo of Korea. The filter has a capacity of 28 CMH, 250 micron with a 0.02 bar differential pressure when clean.
Fuel Oil Supply Suction Filter – Both units are equipped with one fuel oil supply suction filter, duplex type, manufactured by Jeong Woo of Korea. The filter has a capacity of 20.4 CMH, 250 micron with a 0.02 bar differential pressure when clean.

Fuel Oil Engine Inlet Filter – One fuel oil engine inlet filter is on each unit, automatic back flushing type, manufactured by Jeong Woo of Korea. The filter has a capacity of 21.3 CMH, 50 micron with a 0.3 bar differential pressure when clean.

Diesel Oil Filter – Both units are equipped with one diesel oil filter, duplex type, manufactured by Jeong Woo of Korea. The filter has a capacity of 10.2 CMH, 50 micron with a 0.3 bar differential pressure when clean.

Homogenizers – Each unit is equipped with one EM7167 ultrasonic homogenizer. The capacity of the homogenizer's pressurized tanks is 13.8 CMH (based on fuel oil viscosity of 700 Cst at 50 deg. C) at 13 bar. A 3 kW, 460 volts, 3000-rpm mixing motor drives the tanks. Reson System manufactured the homogenizers.

Fuel Oil Purifiers – Both units are equipped with three automatic cleaning and sludge discharge FOPX 613 fuel oil purifiers. The capacity of the purifiers is 11.7 CMH. Alfa Laval manufactured the fuel oil purifiers.

Fuel Oil Engine Inlet Heaters – Each unit is equipped with one electric horizontal oil circulation with quadruple shell tube heaters. The heaters have capacity of 21.3 CMH and have an oil output temperature of 208 degree C. Cetal manufactured the fuel oil heaters.

3.2.3. Fuel Oil Quality Sampling and Testing

Description of equipment and system: Oil quality is sampled, tested and reported back to GPA by SGS Guam, Inc. of Redwood Petroleum and Petrochemical Services.

Sample report headings include the product type, source, type of sample, and date.

Results of the sample are summarized and include the oils API Gravity @ 60 degree f., Viscosity @ 100 degree F, Flash Point, Fire point, Water, Sediment, sulfur, ash content, carbon residue, metals such as Vanadium and aluminum + silicon, and the gross heating value.

3.3. Lube Oil Supply

Description of equipment and system: Cabras 3 and 4 uses lube oil and cylinder lube oil to lubricate and cool the engine and generator bearings and to remove dirt and moisture from the lube oil supply.

The lube oil is delivered by tankers or in drums by Mobil Co. or Shell to the 10 m^3 lube oil storage tank and 80 m^3 cylinder oil storage tank.
From the lube oil storage tank the oil is pumped to the 75 m^3 main lube oil sump tank and from the cylinder oil tank to the 2.2 m^3 cylinder oil service tank in the plant. From the service tank the oil is transfer to engine.

The oil is filtered in the main lube oil sump tank before it is pumped to cool off in the lube oil cooler and filtered again by the lube oil engine inlet filter before pumped to the engine.

3.3.1. Lube Oil Storage and Transfer Equipment Description

Lube Oil Storage Tank – The plant has one outdoor, C.R.T type 10,000- liter tank. . The tank is approximately 2.55 m in diameter and 2.4 m high. Jung Poong, of Korea, manufactured the tanks.

Cylinder Oil Storage Tank – The plant has one outdoor, C.R.T type 80,000- liter tank. The tank is approximately 4.8 m in diameter and 5.1 m high. Jung Poong, of Korea, manufactured the tanks.

Main Lube Oil Sump Tank – The plant has two indoor, rectangular type 75,000- liter tanks. The tanks are approximately 7.0 m in length, 3.5 m wide and 3.4 m high. Tongil Boiler, of Korea, manufactured the tanks.

Cylinder Oil Service Tank – The plant has two indoor, rectangular type 2,200- liter tanks. The tanks are approximately 1.8 m in length, 1.3 m wide and 1.2 m high. Tongil Boiler, of Korea, manufactured the tanks.

Lube Oil Transfer Pumps – Both units are equipped with two outdoor lube oil transfer pumps, screw type L3MG-45/90 IHOKI-G, manufactured by Leistritz . The pumps have a capacity of 7.5 CMH at 3.5 bar. 4.8 kW, 460 volt, 1735 rpm motors drives the pumps.

Lube Oil Unloading Pumps – Both units are equipped with one outdoor lube oil unloading pump, screw type L3MG-38/98 IHOKI-G, manufactured by Leistritz . The pumps have a capacity of 5.0 CMH at 2.0 bar. 2.6 kW, 460 volt, 1728 rpm motors drives the pumps.

Cylinder Oil Unloading Pumps – Both units are equipped with one outdoor lube oil unloading pump, screw type L3MG-38/98 IHOKI-G, manufactured by Leistritz . The pumps have a capacity of 5.0 CMH at 2.0 bar. 4.8 kW, 460 volt, 1737 rpm motors drives the pumps

Main Lube Oil Pumps – Both units are equipped with two indoor main lube oil pumps, screw type L3MG-45/90 IHOKI-G, manufactured by Leistritz . The pumps have a capacity of 7.5 CMH at 3.5 bar. 4.8 kW, 460 volt, 1735 rpm motors drives the pumps.

Camshaft Oil Booster Pumps – Two Leistritz model L3MG-60/156-AHOKI-G screw pumps are on each unit. The pumps have a capacity of 20.8 CMH at 4.5 bar. 9.0 kW, 460 volt, 1732 rpm motors drives the pumps.

Cylinder Oil Transfer Pumps – Both units are equipped with three outdoor lube oil transfer pumps, screw type, L3MG-38/98 IHOKI-G, manufactured by Leistritz . The pumps have a capacity of 5.0 CMH at 2.0 bar. 4.8 kW, 460 volt, 1737 rpm motors drives the pumps.

Lube Oil Coolers – Each unit is equipped with one electric shell tube lube oil cooler, . The oil capacity of the lube oil cooler is 818 CMH at 4.5 bar, inlet temperature of 55.5 deg. C and of outlet temperature of 48 deg. C. The water capacity is 410 CMH at 3.0 bar, inlet temperature 35 deg. C and of outlet temperature of 41.2 deg. C. Dongwa Precision Industry Co., Ltd., manufactured the lube oil coolers.

Lube Oil Purifiers – Both units are equipped with two self-cleaning and auto sludge discharge FOPX 710 lube oil purifiers. The capacity of the purifiers is 5.5 CMH. Alfa Laval manufactured the lube oil purifiers.

Lube Oil Engine Inlet Filters – One lube oil engine inlet filter is on each unit, automatic back flushing type, manufactured by Jeong Woo. The filter has a capacity of 818 CMH, 50 micron with a 0.2 bar differential pressure when clean.

3.4. Compressed Air System

The plant is supplied with starting air, control air, safety air and plain air as instrument air and service air using three 300 NCMH capacity air compressor units. Each unit needs 30 bar g starting pressure. The starting air and instrument air supplied to the engines and each floor through two 10 Nm^3 plant air receiver tanks at 7 bar g. The control air, safety air and service air is supplied to the engines and each floor through two 4 Nm^3 instrument air receiver tanks at 7 bar g.

3.4.1. Compressed Air System Equipment Description

Air Compressors – Both units are equipped with three (3) indoor, motor driven, multi-stage, reciprocating, water cooled, oil free air compressors. The air compressors have capacity of 3000 NCMH at 30 bar g. 75 kW, 460 volt, 1775 rpm motors drive these units. The air compressors are manufactured by Shin Il (Korea).

Plant Air Receiver Tanks – Both units are equipped with two (2) indoor 10 Nm^3 cylindrical plant air receiver tanks. The tanks are 1.96 m diameter and 3.88 m length. The tanks are manufactured by Shin Il (Korea).

Instrument Air Receiver Tanks – Both units are equipped with two (2) indoor 4 Nm^3 cylindrical instrument air receiver tanks. The tanks are 1.35 m diameter and 3.66 m in length. The tanks are manufactured by Shin Il (Korea).

Air Dryers – Both units are equipped with two (2) indoor vertical, duplex 300 NCMH air dryers. The dryers are 1.4 m length, 0.9 m wide, and 2.4 m height. The dryers are manufactured by Shin Il (Korea).

3.5. Station Water Systems

3.5.1. Sea Water Cooling System

3.5.1.1. Inlet Canal

Description of equipment and system: The inlet canal begins at the oceans edge away from the plant property. The canal is approximately 30 feet wide and less than 10 feet deep.

Condition Assessment: The canal requires cleaning and divers are utilized annually to clear debris from in front of the traveling screens. Should dredging be required of the intake structure, GPA will maintain this area since Cabras Units 1 & 2 are also dependent on this system.

3.5.1.2. Traveling Screens

Description of equipment and system: The plant is equipped with three traveling screens for both units. The screens are an inclined type bar screen and are equipped with front spray type traveling screens. Each screen has a screen wash pump for cleaning the screens. The screen openings are 304 SS wire. Il Shin is the manufacturer of the traveling screen.

3.5.1.3. Sea Water Pumps

Description of equipment and system: Each unit is equipped with one 100% capacity sea water pump and one spare pump. The pumps are vertical, centrifugal with semiaxial impeller type pumps. Each pump is capable of 5400 CMH at a total head of 20 meter. The 460 kW, 4160 volt, 889-RPM motors drive the pumps. Thyssen is the manufacturer of the pumps.

3.5.1.4. Sea Water Pipes

Description of equipment and system: The 900 mm/1450 mm diameter sea water pipes are original equipment. Each sea water pump discharge enters into an aboveground 1200 mm pipe (header) and travels under ground to each of the sea water heat exchanger. The pipe is fabricated from carbon steel and epoxy coated.

3.5.1.5. Heat Exchanger Units

Description of equipment and system: Each unit has one 100% heat exchanger which can process 1,222.4 CMH of clean equipment cooling water at an inlet of 51.9-degree C and outlet of 35-degree C. The seawater volume is 3,845 CMH and designed to have a seawater inlet temperature of 29.4-degree C., and outlet of 34.9-degree C. The total surface area of each heat exchanger is 1,387 sq. m. Donghwa Precision Industry Co. Ltd., manufactured the heat exchangers.

The heat exchangers are equipped with debris filters and continuous ball injection tube cleaning devices to remove debris and fouling. The debris filters are auto back washing types. The tube cleaning devices have capacity of 3,845 CMH. Both are manufactured by Taprogge.

3.5.2. Closed Cooling Water System

3.5.2.1. Closed Cooling Water (CCW) Heat Exchangers and Pumps

Description of equipment and system: Each unit is equipped with Closed Low and High Temperature Cooling Water (CCW) systems. The low temperature cooling system supplies cooling water to the heat exchangers, lube oil coolers, jacket water coolers, scavenge air cooler and auxiliary equipment coolers. The high temperature cooling system is used for cooling the cylinder liners, cylinder covers, and engine exhaust valves.

Low Temperature Cooling System - Each units system consists of a pair of 100% circulating pumps and one cooling water expansion tank. The pumps are horizontal centrifugal double suction types, with a capacity of 1,300 CMH at 2.3 bar total dynamic head. The pumps rotate at 1175 rpm and are driven by 150 kW, 460 V motors. Chung Woo manufactured the pumps.

The cooling water expansion tanks are rectangular steel plate type. They have capacity of 3.0 m^3. The tanks are 2.0 m in length, 1.3 m wide and 1.5 m high. Tongil Boiler provided the tanks.

High Temperature Cooling Water System - Each units system consists of a pair of 100% jacket water pumps, one jacket water cooler, one jacket water preheater, one deaerator tank and one jacket water expansion tank.

The jacket water pumps are horizontal centrifugal types, with a capacity of 320 CMH at 2.3 bar total dynamic head. The pumps rotate at 1760 rpm and are driven by 37 kW, 460 V motors. Chung Woo manufactured the pumps.

The jacket water coolers can process 300 CMH of high temperature clean cooling water at an inlet of 80-degree C and outlet of 64.5-degree C. The low temperature volume is 410 CMH and has a clean water inlet temperature of 41.2-degree C., and outlet of 52.6-degree C. The total surface area of each heat exchanger is 135 sq. m. Donghwa Precision Industry Co. Ltd., manufactured the heat exchangers.

The jacket water preheaters are electric heating and shell type. The preheaters have capacity of 30 CMH and 476 kW power source. The preheaters are 0.64 m in diameter and 2.8 m in length and 1.58 m high. Cetal provided the tanks.

The jacket water expansion tanks are rectangular steel plate type. They have capacity of 3.0 m^3. The tanks are 2.2 m in length, 1.2 m wide and 1.5 m high. Tongil Boiler provided the tanks.

3.5.3. Condensate Production/Demineralizer

Description of equipment and system: The condensate/demineralizer system consists of the following equipment:

Raw Water Tank – Each unit has one raw water tank. The tanks hold 20 m^3 and are 3.1 m in diameter and 3.0 m high. Jung Poong manufactured the tanks.

Emulsion Water Storage Tank – The plant has two outdoor emulsion water storage tanks each with a capacity of 80 m^3. The tanks are 4.8 m in diameter and 5.1 m high. Jung Poong manufactured the emulsion water storage tanks.

Water Treatment –. Each unit has one skid mounted demineralized water plant and one fresh water generator. Each plant has 2 fresh water supply pumps, activated carbon filter, micro filter, one mixed bed polisher, 2 chemical measuring tanks, and 2 chemical dosing pumps. Each plant is rated at 6.5 CMH. Water quality was originally specified to be less than 3.0 micro sec/Cm. The manufacturer was the Korea Samyang Water & Sewage Ind., Ltd.

The fresh water generators are skid mounted units consist of three-stage evaporator, one condenser, one distillate cooler, fresh water pump and ejector pump. They have capacity of 130 cm^3 per day, but are currently inoperable. The manufacturer was Serek Como.

3.6. Waste Oil Handling System

The plant has a waste oil handling system consisting of two power house sump pumps, two oily water separators, two fuel oil sludge tanks, two lube oil sludge tanks and two lube oil sludge pumps.

The sump pumps are vertical centrifugal type, with a capacity of 10 CMH at 15 m head. The pumps rotate at 1750 rpm and are driven by 2.2 kW, 460 V motors. Chung Woo manufactured the pumps.

The oily water separators are outdoor rectangular units. No. 1 oily water separator has a capacity of 30 CMH and is 4.0 m in length, 8.0 m wide and 3.0 m high. No. 2 oily water separator has a capacity 10 CMH and is 2.0 m in length, 6.0 m wide and 3.0 m high.

The fuel oil and lube oil sludge tanks are rectangular steel plate type. They have capacity of 3.0 m^3. The tanks are 2.2 m in length, 1.2 m wide and 1.5 m high. Tongil Boiler provided the tanks.

Each unit is equipped with one lube oil sludge pumps, screw type, L3MG-38/98 IHOKI-G, manufactured by Leistritz. The pumps have a capacity of 6.0 CMH at 5.0 bar. 2.6 kW, 460 volt, 1728 rpm motors drives the pumps.

3.7. Balance of Plant Systems

3.7.1. Station Hoist and Cranes

Description of equipment and system: The plant is equipped with a double girder overhead crane, rated at 180 tons with an auxiliary hoist rated at 15 tons. The crane spans 33.3 m and has a lift capacity of 24.7 m. KoneKrane manufactured and currently maintains the crane.

4. Station Performance

GPA operates on an October to September financial reporting year. Plant budgets and performance reporting are structured along this same time frame to reflect the financial reporting standard. The following sections illustrate the monthly/annual unit performances.

4.1. Heat Rate

Description of equipment heat rate results*:* The following history is contract year and fiscal year summary of each unit's heat rate performance calculated from production and fuel consumption data from the last four years:

GHR – Gross Heat Rate (BTU/KWH)
NHR – Net Heat Rate (BTU/KWH)
CF – Capacity Factor (%)

History:

Table 3. Cabras 3 Heat Rate Contract Year Summary

Cabras 3	Gross Generation	Net Generation	Fuel Consumption (Gallons)	Fuel HHV	GHR	NHR	Capacity Factor
2009	89,641,660	85,698,615	5,313,287	149,673	8,871	9,280	74%
2008	261,911,010	250,458,650	15,322,519	149,620	8,753	9,153	73%
2007	259,398,000	248,437,550	15,094,688	148,850	8,662	9,044	72%
2006	237,906,600	224,054,580	13,830,786	148,850	8,653	9,188	65%
2005	242,397,530	226,816,789	13,838,010	148,430	8,474	9,056	66%

Table 4. Cabras 4 Heat Rate Contract Year Summary

Cabras 4	Gross Generation	Net Generation	Fuel Consumption (Gallons)	Fuel HHV	GHR	NHR	Capacity Factor
2009	87,892,593	82,761,356	5,136,727	149,673	8,747	9,290	71%
2008	230,961,140	217,385,040	13,560,139	149,620	8,784	9,333	63%
2007	154,524,810	143,777,950	9,131,879	148,850	8,797	9,454	42%
2006	222,854,400	211,864,040	13,184,330	148,850	8,806	9,263	62%
2005	231,896,510	221,330,781	13,861,183	148,430	8,872	9,296	64%

Table 5. Fiscal Year 2009 Heat Rate Summary

MO./YR	#3 GHR	#3 NHR	#3 CF	#4 GHR	#4 NHR	#4 CF
Oct-08	8,670	8,709	70%	8,654	9,533	70%
Nov-08	8,619	9,058	78%	8,627	9,036	77%
Dec-08	8,633	9,092	74%	8,618	9,069	74%
Jan-09	8,927	9,583	73%	8,713	9,122	64%
Total or Equivalent	8,871	9,280	74%	8,747	9,290	71%

Table 6. Fiscal Year 2008 Heat Rate Summary

MO./YR	#3 GHR	#3 NHR	#3 CF	#4 GHR	#4 NHR	#4 CF
Oct-07	8,560	8,932	72%	8,815	10,892	7%
Nov-07	8,706	9,223	71%	8,809	9,117	58%
Dec-07	8,823	9,467	76%	8,840	9,093	78%
Jan-08	8,755	9,473	62%	8,804	9,066	70%
Feb-08	8,784	9,384	74%	8,783	9,067	76%
Mar-08	8,772	9338.68	74%	8,846	9,282	61%
Apr-08	8,804	9275.17	69%	8,722	9,209	74%
May-08	8,737	9260.8	72%	8,736	9,200	67%
Jun-08	8,758	9199.38	74%	8,769	9,207	76%
Jul-08	8,733	8777	68%	8,776	9,814	56%
Aug-08	8,713	8713	80%	8,768	9,732	72%
Sep-08	8,971	8971	79%	10,001	11,402	54%
Total or Equivalent	**8,753**	**9,153**	**73%**	**8,867**	**9,426**	**62%**

Table 7. Fiscal Year 2007 Cabras Unit 3&4 Heat Rate Performance

MO./YR	#3 GHR	#3 NHR	#3 CF	#4 GHR	#4 NHR	#4 CF
Oct-06	8,739	9,330	74%	8,869	9,325	60%
Nov-06	8,710	9,179	59%	8,789	9,326	69%
Dec-06	8,602	9,019	77%	8,779	9,178	76%
Jan-07	8,631	9,044	77%	8,763	9,254	67%
Feb-07	8,646	8,646	66%	8,746	9,552	71%
Mar-07	8734	8733.99	63%	8812	9,677	66%
Apr-07	8716	8716.49	76%	8772	9,764	58%
May-07	8701	9147.1	74%	8774	9,671	36%
Jun-07	8583	9618.43	76%	0	0	0%
Jul-07	7999	8968	67%	0	0	0%
Aug-07	8156	9033	69%	0	0	0%
Sep-07	8571	8973	77%	0	0	0%
Total or Equivalent	**8,563**	**9,044**	**71%**	**8,797**	**9,426**	**42%**

Table 8. Fiscal Year 2006 Cabras Unit 3&4 Heat Rate Performance

MO./YR	#3 GHR	#3 NHR	#3 CF	#4 GHR	#4 NHR	#4 CF
Oct-05	8,457	9,057	68%	8,569	8,981	58%
Nov-05	8,406	8,944	64%	8,450	8,888	70%
Dec-05	8,374	8,898	72%	8,527	8,903	74%
Jan-06	8,649	9,199	68%	8,957	9,423	69%
Feb-06	8,815	9,486	58%	9,057	9,471	61%
Mar-06	8597	9091.57	74%	8,732	9,198	72%
Apr-06	8624	9073.04	80%	8,788	9,236	81%
May-06	8658	9170.3	74%	8,871	9,353	71%
Jun-06	8595	9134.43	73%	8,929	9,404	41%
Jul-06	8713	9323	43%	8,978	10,171	2%
Aug-06	8692	9173	33%	8,847	9,387	68%
Sep-06	8676	9168	73%	8,813	9,281	72%
Total or Equivalent	**8,599**	**9,130**	**65%**	**8,772**	**9,228**	**62%**

Table 9. Fiscal Year 2005 Cabras Unit 3&4 Heat Rate Performance

MO./YR	#3 GHR	#3 NHR	#3 CF	#4 GHR	#4 NHR	#4 CF
Oct-04	7,923	8,426	73%	7,892	8,334	74%
Nov-04	7,906	8,451	76%	8,279	8,639	60%
Dec-04	8,369	8,137	41%	8,773	9,317	59%
Jan-05	8,071	8,629	74%	8,465	8,856	69%
Feb-05	8,347	8,916	73%	8,783	9,198	72%
Mar-05	8423	9023.56	46%	8,655	9,170	66%
Apr-05	8197	8741.11	69%	8,305	8,725	72%
May-05	8220	8752.51	70%	8,415	8,854	71%
Jun-05	8223	8770.19	72%	8,407	8,866	56%
Jul-05	8317	8916	77%	8,486	8,836	50%
Aug-05	8370	9015	54%	8,518	8,972	52%
Sep-05	8348	8872	72%	8,370	8,773	71%
Total or Equivalent	**8,218**	**8,786**	**66%**	**8,448**	**8,882**	**64%**

Table 10. Fiscal Year 2004 Cabras Unit 3&4 Heat Rate Performance

MO./YR	#3 GHR	#3 NHR	#3 CF	#4 GHR	#4 NHR	#4 CF
Oct-03	8,786	9,471	8%	8,713	8,823	55%
Nov-03	8,307	9,449	41%	8,674	8,775	53%
Dec-03	8,646	9,524	10%	8,859	8,979	59%
Jan-04	7,970	9,208	36%	8,294	8,654	35%
Feb-04	9,217	8,948	58%	8,347	8,695	41%
Mar-04	8010	8701.78	59%	8,240	8,547	65%
Apr-04	7922	8552.29	56%	8,143	8,531	56%
May-04	7908	8500.25	63%	8,156	8,520	63%
Jun-04	8448	9081.37	41%	8,581	9,283	43%
Jul-04	8180	8764	48%	8,230	8,868	57%
Aug-04	8076	8706	50%	8,155	8,827	38%
Sep-04	7914	8483.55	65%	7,879	8,294	75%
Total or Equivalent	**8,086**	**8,868**	**44%**	**8,413**	**8,846**	**53%**

Table 11. Fiscal Year 2003 Cabras Unit 3&4 Heat Rate Performance

MO./YR	#3 GHR	#3 NHR	#3 CF	#4 GHR	#4 NHR	#4 CF
Oct./2002	0	0	0.00%	8,044	8,044	75.04%
Nov./2002	0	0	0.00%	7,949	7,951	83.68%
Dec./2002	0	0	0.00%	8,047	8,049	12.20%
Jan./2003	0	0	0.00%	0	0	0.00%
Feb./2003	0	0	0.00%	0	0	0.00%
Mar./2003	0	0	0.00%	0	0	0.00%
Apr./2003	0	0	0.00%	0	0	0.00%
May./2003	0	0	0.00%	7,249	7,249	0.15%
Jun./2003	0	0	0.00%	8,028	8,953	29.24%
Jul./2003	0	0	0.00%	8,547	8,786	58.33%
Aug./2003	0	0	0.00%	N/A	N/A	N/A
Sep./2003	0	0	0.00%	8,576	8,763	60.51%
Total or Equivalent	**N/A**	**N/A**	**N/A**	**8,063**	**8,256**	**45.59%**

**Note: No Total or Equivalent data for Cabras Unit 3 due to the Fire Incident.

Table 12. Fiscal Year 2002 Cabras Unit 3&4 Heat Rate Performance

MO./YR	#3 GHR	#3 NHR	#3 CF	#4 GHR	#4 NHR	#4 CF
Oct./2001	8,686	9,471	60.43%	8,713	8,823	63.90%
Nov./2001	8,670	9,449	64.10%	8,674	8,775	73.41%
Dec./2001	8,711	9,524	60.46%	8,859	8,979	62.98%
Jan./2002	8,755	9,506	57.47%	8,952	9,074	62.33%

MO./YR	#3 GHR	#3 NHR	#3 CF	#4 GHR	#4 NHR	#4 CF
Feb./2002	8,614	9,373	10.91%	9,120	9,245	11.42%
Mar./2002	0	0	0.00%	9,017	9,555	3.58%
Apr./2002	0	0	0.00%	8,553	8,628	53.89%
May./2002	0	0	0.00%	8,572	8,574	75.14%
Jun./2002	0	0	0.00%	8,546	8,547	73.16%
Jul./2002	0	0	0.00%	8,776	8,777	30.29%
Aug./2002	0	0	0.00%	8,728	8,730	48.41%
Sep./2002	0	0	0.00%	8,447	8,447	74.12%
Total or Equivalent	**8,687**	**9,465**	**50.67%**	**8,746**	**8,846**	**52.72%**

**Note: Total or Equivalent does not include March 2002 through September 2002 for Cabras Unit 3 due to the Fire Incident.

Table 13. Fiscal Year 2001 Cabras Unit 3&4 Heat Rate Performance

MO./YR	#3 GHR	#3 NHR	#3 CF	#4 GHR	#4 NHR	#4 CF
Oct./2000	8,308	8,527	79.55%	N/A	N/A	-0.12%
Nov./2000	8,346	8,797	73.62%	N/A	N/A	0.00%
Dec./2000	8,178	8,600	84.15%	N/A	N/A	0.00%
Jan./2001	8,352	9,049	54.86%	8,758	9,572	11.32%
Feb./2001	8,328	8,918	68.36%	8,962	9,068	45.74%
Mar./2001	8,288	8,747	77.43%	N/A	N/A	-0.13%
Apr./2001	8,235	8,693	68.85%	N/A	N/A	-0.14%
May/2001	8,157	8,629	84.03%	8,727	9,355	2.76%
Jun./2001	8,408	9,199	47.95%	8,048	8,154	49.93%
Jul./2001	8,137	8,875	58.25%	8,270	8,412	57.98%
Aug./2001	8,070	8,801	62.07%	8,515	8,683	48.41%
Sep./2001	N/A	N/A	N/A	N/A	N/A	-0.14%
Total or Equivalent	**8,255**	**8,803**	**63%**	**8,547**	**8,874**	**25.55%**

**Note: Total or Equivalent does not include October 2000 through January 2001 for Cabras Unit 4 due to the Fuel Oil Heater Room Fire.

Table 14. Fiscal Year 2000 Cabras Unit 3&4 Heat Rate Performance

MO./YR	#3 GHR	#3 NHR	#3 CF	#4 GHR	#4 NHR	#4 CF
Oct./1999	9,398	10,300	31.92%	N/A	N/A	-0.17%
Nov./1999	8,226	8,894	45.80%	N/A	N/A	-0.01%
Dec./1999	9,046	9,609	43.46%	N/A	N/A	-0.32%
Jan./2000	8,288	8,935	44.20%	N/A	N/A	-0.18%
Feb./2000	8,604	9,088	74.28%	N/A	N/A	-0.11%
Mar./2000	8,935	9,419	79.47%	N/A	N/A	-0.19%
Apr./2000	8,571	9,106	56.27%	N/A	N/A	-0.19%
May/2000	8,556	9,025	74.76%	N/A	N/A	-0.20%

MO./YR	#3 GHR	#3 NHR	#3 CF	#4 GHR	#4 NHR	#4 CF
Jun./2000	8,378	8,925	56.50%	N/A	N/A	-0.16%
Jul./2000	8,585	9,102	59.37%	N/A	N/A	-0.17%
Aug./2000	8,472	8,927	76.43%	N/A	N/A	-0.10%
Sep./2000	8,670	9,170	63.28%	N/A	N/A	-0.14%
Total or Equivalent	**8,644**	**9,208**	**59%**	**N/A**	**N/A**	**-0.16%**

**Note: Cabras Unit 4 Undergoing repairs due to Fuel Oil Heater Fire.

Table 15. Fiscal Year 1999 Cabras Unit 3&4 Heat Rate Performance

MO./YR	#3 GHR	#3 NHR	#3 CF	#4 GHR	#4 NHR	#4 CF
Oct./1998	8,598	8,911	69.42%	8,501	8,810	78.62%
Nov./1998	8,732	9,604	67.85%	8,615	8,941	74.78%
Dec./1998	8,673	8,989	76.67%	8,574	8,886	76.77%
Jan./1999	8,465	8,772	71.46%	8,702	9,012	64.89%
Feb./1999	8,531	8,855	58.60%	8,776	9,109	71.63%
Mar./1999	8,451	8,780	66.62%	8,732	9,073	63.99%
Apr./1999	8,442	8,729	83.34%	8,673	8,967	81.42%
May/1999	8,492	8,815	73.12%	8,738	9,070	80.19%
Jun./1999	7,737	8,089	79.23%	8,739	9,136	62.78%
Jul./1999	8,567	9,022	55.68%	8,301	8,741	67.81%
Aug./1999	8,442	9,054	43.52%	8,723	9,355	8.88%
Sep./1999	8,374	8,909	68.54%	N/A	N/A	N/A
Total or Equivalent	**8,446**	**8,808**	**67.84%**	**8,617**	**8,958**	**60.96%**

**Note: Cabras Unit 4 Fuel Oil Heater Room Fire occurred in August 1999.

Table 16. Fiscal Year 1998 Cabras Unit 3&4 Heat Rate Performance

MO./YR	#3 GHR	#3 NHR	#3 CF	#4 GHR	#4 NHR	#4 CF
Oct./1997	8,329	8,803	75.78%	8,557	8,743	77.84%
Nov./1997	8,257	8,262	64.99%	8,391	8,744	83.93%
Dec./1997	8,329	8,556	48.21%	8,241	8,983	22.87%
Jan./1998	8,226	8,397	73.01%	8,178	8,536	69.16%
Feb./1998	8,111	8,314	57.62%	8,349	8,558	41.20%
Mar./1998	8,284	8,359	79.58%	8,378	8,715	79.47%
Apr./1998	8,271	8,739	82.77%	8,484	8,667	66.47%
May/1998	8,082	8,402	76.97%	9,356	9,725	62.40%
Jun./1998	8,608	9,087	85.95%	9,012	9,604	67.41%
Jul./1998	8,371	8,838	82.69%	8,770	8,857	52.66%
Aug./1998	8,446	8,944	63.21%	8,630	8,923	60.95%
Sep./1998	8,376	8,875	82.64%	8,504	8,578	72.18%
Total or Equivalent	**8,314**	**8,644**	**72.84%**	**8,580**	**8,874**	**63.12%**

Table 17. Fiscal Year 1997 Cabras Unit 3&4 Heat Rate Performance

MO./YR	#3 GHR	#3 NHR	#3 CF	#4 GHR	#4 NHR	#4 CF
Oct./1996	8,435	8,954	61.16%	7,991	8,083	80.93%
Nov./1996	8,385	8,933	79.10%	8,440	8,534	83.55%
Dec./1996	8,560	9,194	67.11%	8,674	8,751	82.14%
Jan./1997	8,074	8,661	73.07%	8,123	8,288	67.71%
Feb./1997	8,181	8,553	83.09%	8,105	8,192	86.32%
Mar./1997	8,004	8,005	82.98%	8,138	8,581	82.92%
Apr./1997	8,187	8,705	58.33%	8,416	8,553	69.45%
May/1997	8,146	8,792	80.52%	8,208	8,312	91.76%
Jun./1997	8,370	8,973	71.91%	8,610	8,746	86.16%
Jul./1997	8,423	8,970	84.62%	8,508	8,657	88.92%
Aug./1997	8,267	8,758	82.32%	8,649	8,649	51.65%
Sep./1997	7,856	8,424	74.81%	8,608	8,742	82.35%
Total or Equivalent	**8,314**	**8,644**	**72.84%**	**8,337**	**8,486**	**79.42%**

Expectations Assessment:

GPA is looking for improvements in plant net heat rate over the design guarantee and the latest performance test result.

For the next PMC period (years 2010 onwards), GPA sets it heat rate incentive/penalty bandwidth at 2% for the first contract year (penalty only) and 1% for the succeeding contract years, that is:

- Actual Heat Rates greater than 102% for the first year and 101% for the succeeding years shall be subject to penalties.
- Actual Heat Rates lower than 100% for the first year and 99% for the succeeding years shall be subject to incentives.

It is also expected that the PMC will conduct annual Performance Testing, results of which shall be used to establish the heat rate curve.

For specific details as to the new desired performance levels, please refer to the following documents:

- Appendix F: Performance Guarantees
- Appendix G: Incentive/Penalty Assessments
- Volume IV: Proposal Scoring Mechanism

4.2. Historical Operational Performance

Description of Reliability Reporting System: The following history is a monthly/annual summary of each unit's performance based on available/running hours and forced outage hours. Calculations were based on NERC definitions and equations:

FOH – Forced Outage Hours
EFOR – Equivalent Forced Outage Rate
EAF – Equivalent Availability Factor

History:

Prior to the start of the PMC contract, Cabras 3&4 had fairly low EAFs, due mainly to various equipment problems such as derated operating capacities to ensure safe running.

As part of the contract requirements, Doosan's performance guarantees were to:

- Maintain an average EAF of at least 91% during the first year
- Maintain an average EAF of at least 92% during the second year
- Maintain 93% average EAF for the remaining 3 years of the contract

* all data were obtained from current PMC's monthly reports

Table 18. Contract Year Summary of Cabras 3&4 Operational Performance

YEAR	Cabras Unit # 3			Cabras Unit # 4			PMC Guarantee	PUC Standard
	FOH	EFOR	EAF	FOH	EFOR	EAF		
2005	133.24	1.55%	**92.30%**	157.95	2.02%	**91.23%**	**91%**	**76%**
2006	154.14	2.12%	87.20%	163.03	3.50%	84.44%	**92%**	**76%**
2007	179.69	2.14%	**95.60%**	3,969.50	45.82%	51.15%	**93%**	**90%**
2008	160.35	1.93%	**93.90%**	165.37	3.24%	**93.81%**	**93%**	**90%**
AVERAGE		**1.93%**	**92.25%**		**13.64%**	**80.16%**		

Table 19. Fiscal Year 2009 Cabras Unit 3&4 Operational Performance

MO./YR	#3 FOH	#3 EFOR	#3 EAF	#4 FOH	#4 EFOR	#4 EAF
Oct-08		2.25%	87.37%		2.45%	94.99%
Nov-08		0.16%	99.84%		0.59%	98.78%
Dec-08		1.66%	98.34%		1.40%	98.60%
Jan-09		0.00%	100.00%		1.50%	88.03%
Feb-09						
Mar-09						
Total or Equivalent	**0.00 Hours**	**0.77%**	**96.36%**	**0.00 Hours**	**1.49%**	**95.07%**

Table 20. Fiscal Year 2008 Cabras Unit 3&4 Operational Performance

MO./YR	#3 FOH	#3 EFOR	#3 EAF	#4 FOH	#4 EFOR	#4 EAF
Oct-07	10.70	1.00%	99%	609.22	87.00%	11%
Nov-07	6.12	1.00%	95%	7.68	1.00%	86%
Dec-07	6.45	1.00%	99%	10.45	1.00%	99%
Jan-08	25.98	4.00%	82%	23.65	7.00%	89%
Feb-08	17.60	2.53%	97%	9.03	1.30%	99%
Mar-08	2.68	2.23%	93%	18.87	3.87%	90%
Apr-08	7.47	1.14%	90%	1.20	0.17%	98%
May-08	28.25	3.89%	94%	70.97	9.73%	89%
Jun-08	23.03	3.20%	97%	0.35	0.05%	100%
Jul-08	9.88	1.53%	85%	29.90	4.74%	81%
Aug-08	13.70	1.84%	98%	11.40	1.53%	98%
Sep-08	3.23	0.45%	99%		5.73%	90%
Total or Equivalent	**155.09 Hours**	**2.00%**	**94%**	**792.72 Hours**	**10%**	**85.64%**

Note: Repairs for Cabras 4 Crankcase Fire Incident were completed on October 2007.

Table 21. Fiscal Year 2007 Cabras Unit 3&4 Operational Performance

MO./YR	#3 FOH	#3 EFOR	#3 EAF	#4 FOH	#4 EFOR	#4 EAF
Oct-06	7.95	1.07%	98.93%	17.78	2.80%	82.91%
Nov-06	10.22	1.68%	83.30%	8.08	1.12%	98.88%
Dec-06	9.83	1.32%	98.68%	8.03	1.08%	98.92%
Jan-07	0.00	0.00%	100.00%	0.50	0.07%	89.59%
Feb-07	53.68	8.90%	81.72%	19.45	2.91%	96.52%
Mar-07	7.03	1.00%	93.36%	0.00	0.00%	100.00%
Apr-07	18.15	2.52%	97.48%	44.45	6.98%	82.28%
May-07	22.18	2.98%	97.02%	349.75	47.01%	52.99%
Jun-07	0.00	0.00%	99.66%	720.00	100.00%	0.00%
Jul-07	9.37	1.37%	90.73%	744.00	100.00%	0.00%
Aug-07	40.58	5.45%	94.55%	744.00	100.00%	0.00%
Sep-07	5.43	0.75%	99.25%	720.00	100.00%	0.00%
Total or Equivalent	**184.42 Hours**	**2.21%**	**95%**	**3,376.04 Hours**	**38.64%**	**58.34%**

Note: Cabras 4 Crankcase Fire Incident on May 2007.

Table 22. Fiscal Year 2006 Cabras Unit 3&4 Operational Performance

MO./YR	#3 FOH	#3 EFOR	#3 EAF	#4 FOH	#4 EFOR	#4 EAF
Oct-05	9.13	1.26%	96.05%	17.88	2.81%	82.19%
Nov-05	0.00	0.00%	92.29%	11.80	1.64%	98.36%
Dec-05	27.53	3.70%	96.30%	8.15	1.10%	98.04%
Jan-06	16.58	2.23%	97.77%	3.90	0.52%	99.48%
Feb-06	1.67	0.30%	82.29%	13.93	2.39%	84.67%
Mar-06	9.30	1.25%	98.75%	10.32	1.41%	97.28%
Apr-06	19.57	2.72%	97.28%	0.00	0.00%	100.00%
May-06	23.75	3.20%	96.48%	68.52	9.21%	90.79%
Jun-06	14.73	2.14%	93.54%	3.52	0.80%	60.48%
Jul-06	9.57	2.18%	57.72%	6.33	19.13%	3.60%
Aug-06	18.80	5.47%	43.68%	11.30	1.52%	98.48%
Sep-06	12.17	1.69%	98.31%	11.32	1.57%	98.43%
Total or Equivalent	**162.80 Hours**	**2.20%**	**87%**	**166.97 Hours**	**3.54%**	**84.26%**

Table 23. Fiscal Year 2005 Cabras Unit 3&4 Operational Performance

MO./YR	#3 FOH	#3 EFOR	#3 EAF	#4 FOH	#4 EFOR	#4 EAF
Oct-04	3.00	0.40%	99.60%	23.37	3.14%	96.86%
Nov-04	0.00	0.00%	100.00%	10.54	1.46%	81.87%
Dec-04	74.51	10.01%	70.63%	2.20	0.30%	99.70%
Jan-05	0.00	0.00%	100.00%	11.02	1.53%	98.52%
Feb-05	4.22	0.64%	99.37%	7.45	1.11%	98.89%
Mar-05	0.20	0.04%	63.41%	0.98	0.15%	89.24%
Apr-05	9.25	1.32%	96.07%	4.08	0.57%	99.43%
May-05	51.98	6.98%	93.01%	8.27	0.78%	98.89%
Jun-05	7.40	1.05%	96.71%	46.72	7.53%	80.82%
Jul-05	14.60	2.00%	96.17%	30.03	5.47%	74.26%
Aug-05	7.30	1.22%	79.64%	0.00	0.00%	78.86%
Sep-05	1.63	0.23%	99.77%	11.57	1.62%	98.39%
Total or Equivalent	**174.09 Hours**	**2.02%**	**91%**	**156.23 Hours**	**1.97%**	**91.26%**

Table 24. Fiscal Year 2004 Cabras Unit 3&4 Operational Performance

MO./YR	#3 FOH	#3 EFOR	#3 EAF	#4 FOH	#4 EFOR	#4 EAF
Oct-03	98.97	38.90%	11.38%	2.82	2.82%	59.13%
Nov-03	0.00	0.00%	52.93%	0.00	0.00%	53.03%
Dec-03	147.68	54.82%	9.47%	8.23	8.23%	68.65%
Jan-04	Data Not Available	1%	56%	Data Not Available	1%	69%
Feb-04	Data Not Available	0%	86%	Data Not Available	0%	45%
Mar-04	Data Not Available	5%	75%	Data Not Available	0.41%	65%
Apr-04	Data Not Available	0%	72%	Data Not Available	2%	85%
May-04	Data Not Available	0%	81%	Data Not Available	0%	76%
Jun-04	Data Not Available	0%	63%	Data Not Available	6%	87%
Jul-04	Data Not Available	4%	67%	Data Not Available	0%	66%
Aug-04	Data Not Available	0%	70%	Data Not Available	1%	85%
Sep-04	Data Not Available	2%	75%	Data Not Available	0.17%	53%
Total or Equivalent	**Hours**	**10.00%**	**60%**	**Hours**	**2.00%**	**70%**

**Note: Cabras Unit 3 Startup and Running In Program began October 2003

Table 25. Fiscal Year 2003 Cabras Unit 3&4 Operational Performance

MO./YR	#3 FOH	#3 EFOR	#3 EAF	#4 FOH	#4 EFOR	#4 EAF
Oct./2002	744.00	100.00%	0.00%	20.58	7.25%	51.56%
Nov./2002	720.00	100.00%	0.00%	3.43	0.51%	93.06%
Dec./2002	744.00	100.00%	0.00%	0.00	0.00%	14.66%
Jan./2003	744.00	100.00%	0.00%	0.00	0.00%	0.00%
Feb./2003	672.00	100.00%	0.00%	0.00	0.00%	0.00%
Mar./2003	744.00	100.00%	0.00%	0.00	0.00%	0.00%
Apr./2003	720.00	100.00%	0.00%	0.00	0.00%	0.00%
May./2003	744.00	100.00%	0.00%	0.00	0.00%	3.23%
Jun./2003	720.00	100.00%	0.00%	0.00	0.00%	51.20%
Jul./2003	744.00	100.00%	0.00%	0.00	0.00%	22.15%
Aug./2003	744.00	100.00%	0.00%	N/A	N/A	N/A
Sep./2003	720.00	100.00%	0.00%	0.00	0.00%	62.65%
Total or Equivalent	**8760 Hours**	**100.00%**	**0.00%**	**24.01 Hours**	**0.71%**	**27.14%**

**Note: Cabras Unit 3 undergoing repairs due to Fire Incident.

Table 26. Fiscal Year 2002 Cabras Unit 3&4 Operational Performance

MO./YR	#3 FOH	#3 EFOR	#3 EAF	#4 FOH	#4 EFOR	#4 EAF
Oct./2001	28.57	3.95%	93.27%	53.27	12.39%	60.10%
Nov./2001	17.80	2.56%	94.19%	2.77	0.38%	99.62%
Dec./2001	0.00	0.00%	97.28%	5.65	0.81%	93.48%
Jan./2002	26.38	3.66%	93.36%	0.00	0.00%	97.78%
Feb./2002	543.33	82.12%	17.60%	543.33	82.16%	17.56%
Mar./2002	744.00	100.00%	0.00%	0.00	0.00%	4.37%
Apr./2002	720.00	100.00%	0.00%	13.53	2.66%	57.79%
May./2002	744.00	100.00%	0.00%	10.90	1.50%	80.77%
Jun./2002	720.00	100.00%	0.00%	11.95	1.68%	79.33%
Jul./2002	744.00	100.00%	0.00%	16.45	5.83%	31.98%
Aug./2002	744.00	100.00%	0.00%	5.92	1.15%	60.02%
Sep./2002	720.00	100.00%	0.00%	5.15	2.71%	94.20%
Total or Equivalent	**5752.08 Hours**	**66.02%**	**32.98%**	**668.92 Hours**	**9.27%**	**64.75%**

**Note: Cabras Unit 3 Fire Incident occurred February 6, 2002.

Table 27. Fiscal Year 2001 Cabras Unit 3&4 Operational Performance

MO./YR	#3 FOH	#3 EFOR	#3 EAF	#4 FOH	#4 EFOR	#4 EAF
Oct./2000	0.00	0.00%	97.00%	744.00	100.00%	0.00%
Nov./2000	09.7	0.20%	86.80%	720.00	100.00%	0.00%
Dec./2000	6.88	1.00%	96.10%	744.00	100.00%	0.00%
Jan./2001	18.27	3.30%	72.20%	578.22	81.10%	96.90%
Feb./2001	57.45	8.50%	91.50%	34.00	5.30%	91.00%
Mar./2001	25.20	3.40%	96.60%	0.00	0.00%	0.00%
Apr./2001	21.95	3.60%	82.50%	0.00	0.00%	0.00%
May/2001	10.45	1.40%	98.60%	24.00	36.1%	5.70%
Jun./2001	37.12	6.60%	72.50%	68.00	0.10%	90.50%
Jul./2001	54.78	8.10%	86.70%	66.98	9.70%	83.70%
Aug./2001	47.95	6.90%	87.40%	4.03	0.80%	68.40%
Sep./2001	5.48	1.00%	73.00%	23.35	5.40%	57.00%
Total or Equivalent	**286.50 Hours**	**3.70%**	**86.80%**	**3006.58 Hours**	**36.54%**	**41.10%**

**Note: Cabras Unit 4 Startup occurred in January 2001.

Table 28. Fiscal Year 2000 Cabras Unit 3&4 Operational Performance

MO./YR	#3 FOH	#3 EFOR	#3 EAF	#4 FOH	#4 EFOR	#4 EAF
Oct./1999	179.47	33.97%	46.88%	744.00	100.00%	0.00%
Nov./1999	70.7	14.31%	68.20%	720.00	100.00%	0.00%
Dec./1999	7.18	1.47%	64.69%	744.00	100.00%	0.00%
Jan./2000	0.00	0.00%	65.50%	744.00	100.00%	0.00%

Mo./YR	#3 FOH	#3 EFOR	## EAF	#4 FOH	#4 EFOR	#4 EAF
Feb./2000	0.00	0.00%	97.70%	672.00	100.00%	0.00%
Mar./2000	0.00	0.00%	98.08%	744.00	100.00%	0.00%
Apr./2000	16.92	2.99%	76.26%	720.00	100.00%	0.00%
May/2000	0.00	0.00%	99.75%	744.00	100.00%	0.00%
Jun./2000	0.00	0.00%	79.25%	720.00	100.00%	0.00%
Jul./2000	5.40	0.89%	80.60%	744.00	100.00%	0.00%
Aug./2000	0.00	0.00%	98.50%	744.00	100.00%	0.00%
Sep./2000	0.00	0.00%	80.10%	720.00	100.00%	0.00%
Total or Equivalent	**279.67 Hours**	**4.47%**	**79.62%**	**8760.00 Hours**	**100.00%**	**0.00%**

**Note: Cabras Unit 4 undergoing repairs due to Fuel Oil Heater Room Fire.

Table 29. Fiscal Year 1999 Cabras Unit 3&4 Operational Performance

MO./YR	#3 FOH	#3 EFOR	#3 EAF	#4 FOH	#4 EFOR	#4 EAF
Oct./1998	52.30	7.65%	84.82%	17.67	3.63%	94.08%
Nov./1998	6.83	1.13%	82.92%	60.95	0.27%	91.28%
Dec./1998	6.18	0.85%	96.63%	0.00	3.51%	96.49%
Jan./1999	44.74	6.03%	93.78%	102.05	0.18%	86.13%
Feb./1999	89.28	15.48%	72.57%	0.00	1.68%	98.32%
Mar./1999	9.29	1.28%	96.16%	97.86	0.00%	86.85%
Apr./1999	6.91	0.96%	99.04%	4.39	0.00%	99.39%
May/1999	8.25	1.29%	85.13%	1.77	1.27%	98.49%
Jun./1999	47.03	8.15%	91.85%	116.35	2.16%	82.03%
Jul./1999	73.05	13.15%	69.53%	40.47	4.79%	90.03%
Aug./1999	27.10	12.01%	80.82%	0.00	87.61%	12.39%
Sep./1999	43.39	17.77%	82.23%	0.00	100.00%	0.00%
Total or Equivalent	**414.35 Hours**	**7.02%**	**86.37%**	**441.51 Hours**	**17.09%**	**77.96%**

**Note: Cabras Unit 4 Fuel Oil Heater Room Fire occurred in August 1999.

Table 30. Fiscal Year 1998 Cabras Unit 3&4 Operational Performance

MO./YR	#3 FOH	#3 EFOR	#3 EAF	#4 FOH	#4 EFOR	#4 EAF
Oct./1997	4.39	0.59%	99.13%	8.48	4.19%	91.35%
Nov./1997	6.65	1.19%	76.50%	0.00	0.00%	98.99%
Dec./1997	41.25	5.56%	94.20%	21.24	11.77%	66.77%
Jan./1998	2.38	0.32%	99.68%	62.03	8.24%	91.76%
Feb./1998	5.55	1.20%	68.05%	0.00	27.62%	72.38%
Mar./1998	8.76	1.18%	98.82%	0.43	0.06%	99.94%
Apr./1998	30.54	4.24%	95.76%	32.44	1.36%	85.01%
May/1998	6.75	1.02%	88.11%	1.17	0.20%	80.41%
Jun./1998	10.28	1.43%	98.17%	7.14	1.06%	92.14%
Jul./1998	0.48	0.07%	93.14%	0.00	0.00%	69.73%

Mo./YR	#3 FOH	#3 EFOR	## EAF	#4 FOH	#4 EFOR	#4 EAF
Aug./1988	12.79	5.40%	83.76%	0.00	0.37%	89.07%
Sep./1988	15.73	2.18%	97.82%	26.30	3.66%	96.13%
Total or Equivalent	**145.55 Hours**	**2.06%**	**91.27%**	**159.23 Hours**	**4.91%**	**85.89%**

Table 31. Fiscal Year 1997 Cabras Unit 3&4 Operational Performance

MO./YR	#3 FOH	#3 EFOR	#3 EAF	#4 FOH	#4 EFOR	#4 EAF
Oct./1996	30.13	5.36%	71.45%	18.62	2.74%	96.24%
Nov./1996	26.31	4.15%	95.85%	7.85	1.62%	97.81%
Dec./1996	32.33	7.02%	76.28%	35.39	4.85%	93.18%
Jan./1997	27.25	7.75%	86.58%	39.79	6.35%	78.88%
Feb./1997	0.00	0.00%	97.73%	0.00	0.00%	97.88%
Mar./1997	5.60	1.13%	98.87%	10.31	1.47%	98.61%
Apr./1997	47.41	33.08%	66.32%	27.05	4.54%	78.94%
May/1997	38.62	5.19%	94.81%	0.00	0.00%	100.00%
Jun./1997	5.73	0.94%	84.03%	13.85	1.92%	98.08%
Jul./1997	15.76	2.16%	95.93%	3.46	0.47%	99.53%
Aug./1997	9.43	1.27%	98.73%	14.90	2.96%	65.60%
Sep./1997	19.66	7.41%	90.48%	28.72	3.57%	96.43%
Total or Equivalent	**258.23 Hours**	**4.30%**	**88.10%**	**196.94 Hours**	**6.37%**	**91.46%**

Expectations Assessment:

GPA is looking for improvements in plant performance well above the aforementioned items. For the next PMC period (years 2010 onwards), GPA set its Minimum Availability Standards and contract requirements as follows:

- GPA sets its minimum EAF standard at 91% for the 5 contract years
  - The PMC is required to meet this standard or propose an EAF Guarantee higher than 91%.
- GPA will consider five one-year contract extensions if the PMC has an average EFOR of 2% or less for each contract year
  - Contract extensions will not be considered if the PMC's average EFOR is greater than 2%.

For specific details as to the new desired performance levels, please refer to the following documents:

- Appendix F: Performance Guarantees
- Appendix G: Incentive/Penalty Assessments
- Vollume IV: Proposal Scoring Mechanism

4.3. Performance Testing Results

Annual performance tests are conducted to monitor the engine performance and efficiency of the units.

During the contract period with Doosan, the tests were conducted under ISO conditions in Emulsion Mode where fuel mixture is 79% Fuel and 21% water.

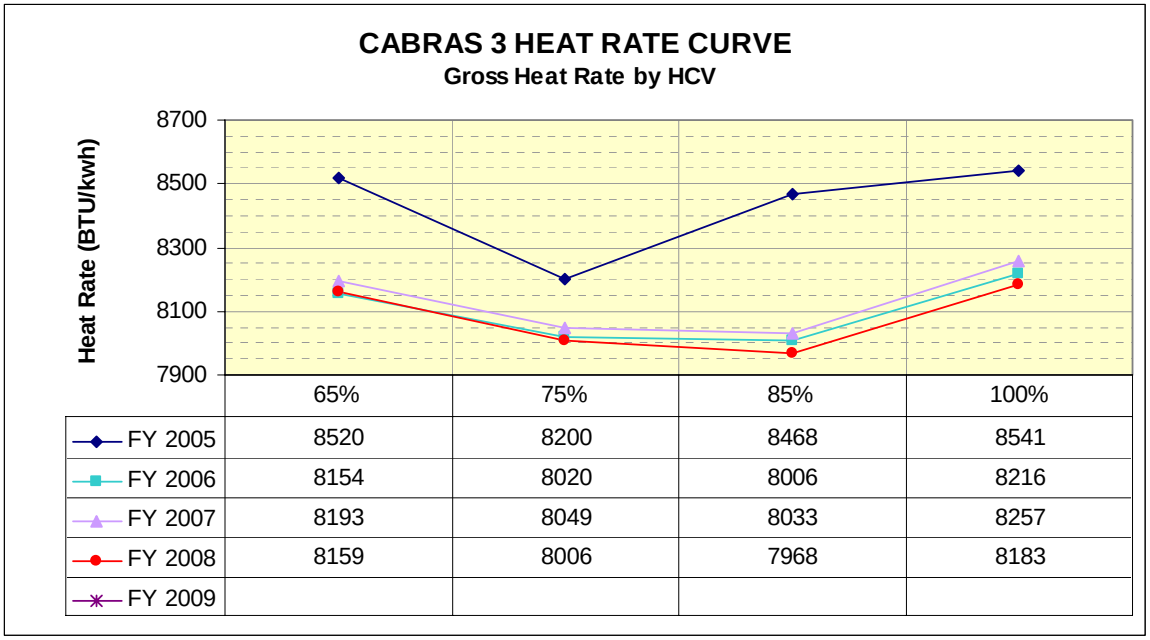
To determine the engine's operating characteristics, the following data were recorded at 65%, 75%, 85% and 100% rated load capacity:

- Specific Fuel Oil Consumption (SFOC)
- Heat Rate (HR)
- Cylinder Oil Consumption
- Lubricating Oil Consumption

The performance test results in 2009 will be used for calculating the Baseline Heat Rate curves for Cabras 3 & 4.

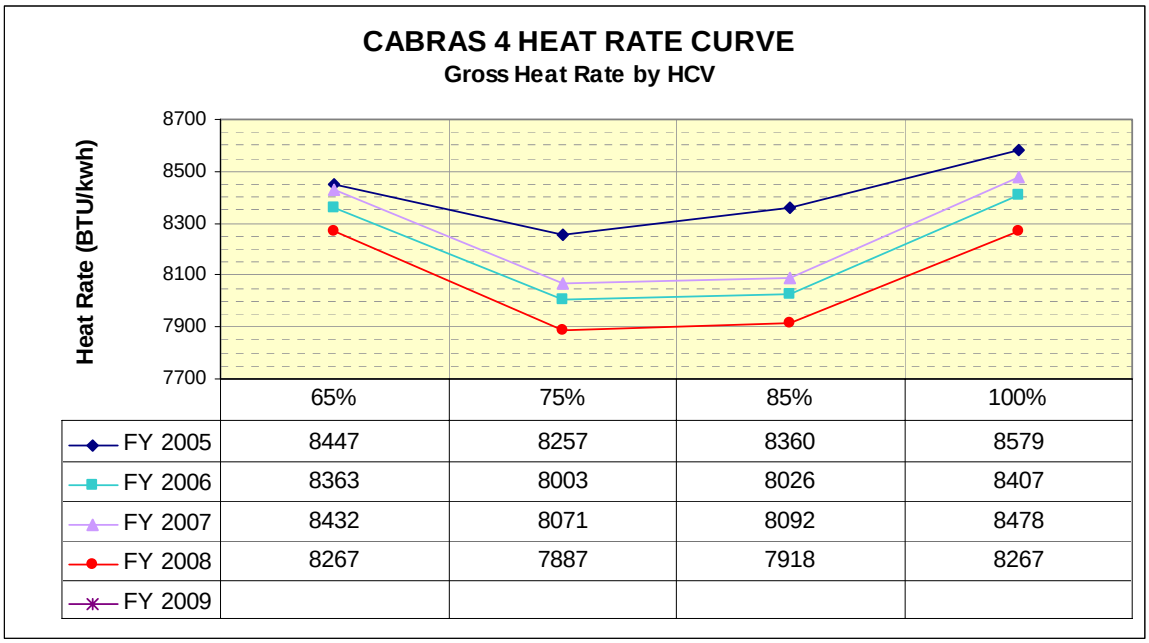
To illustrate the unit performances, the results (up to 2008) are graphed below:

Figure 1. Cabras Gross Heat Rate Curve (HCV)



	65%	75%	85%	100%
FY 2005	8520	8200	8468	8541
FY 2006	8154	8020	8006	8216
FY 2007	8193	8049	8033	8257
FY 2008	8159	8006	7968	8183
FY 2009				

Figure 2. Cabras 4 Gross Heat Rate Curve (HCV)



	65%	75%	85%	100%
FY 2005	8447	8257	8360	8579
FY 2006	8363	8003	8026	8407
FY 2007	8432	8071	8092	8478
FY 2008	8267	7887	7918	8267
FY 2009				

Expectations Assessment:

GPA expects the PMC to conduct performance testing every contract year, thirty (30) days aftere contract commencement anniversary. Improvement targets are established and discussed in the Performance Incentive/Penalty Assessment (Appendix G) and the Scoring Mechanism document (Volume IV). For specific details, please refer to the following documents:

- Appendix F: Performance Guarantees
- Appendix G: Incentive/Penalty Assessments
- Volume IV: Socring Mechanism

4.4. Emissions Test Trending

The performance management contract includes mandatory Annual Emissions Testing and Maintenance of the Continuous Emissions Monitoring Equipment. Doosan Engine contracted Emissions Technologies Inc. to perform these tests in conjuction with the Annual Performance Tests. An Atmospheric Emission Compliance Report, which details the results of the testing performed at 100% load capacity, is submitted.

The following specific stack emissions parameters are closely monitored and tested to ensure compliance with EPA-mandated Emission Limits:

- Particulates
- Sulfuar Dioxide
- Oxides of Nitrogen
- Carbon Monoxide
- Total Hydrocarbons
- Opacity

The EPA Allowable Limits are as follows:

Table 32. Guam EPA Emissions Limit (as of January 2004)

	TEST METHOD	EMISSIONS LIMIT
Particulates	EPA Method 5B	93 lb/hr
SO_2	EPA Method 6C	737 lb/hr
NO_x as NO_2	EPA Method 7E	1219 lb/hr
NO_x	EPA Method 7E	950 ppm
CO	EPA Method 10	110 lb/hr
VOC	EPA Method 25A	96 lb/hr
Opacity	EPA Method 9	20%
Water-to-Fuel Injection Rate		33% by volume
Sulfur Content in No. 6 Fuel Oil		2.0 % by weight (HSF) 1.19 % by weight (LSF)

History: The succeeding graphs illustrate the Emission Test Results from 2005 onwards.

Figure 3. Particulate Emissions.

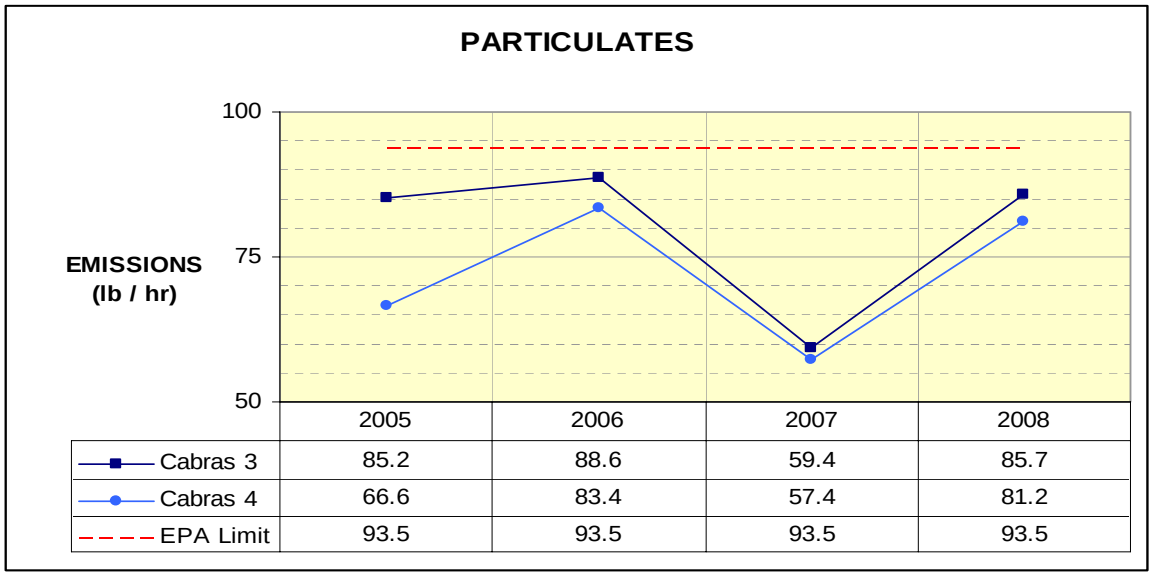


Figure 4. Sulfur Dioxide Emissions.

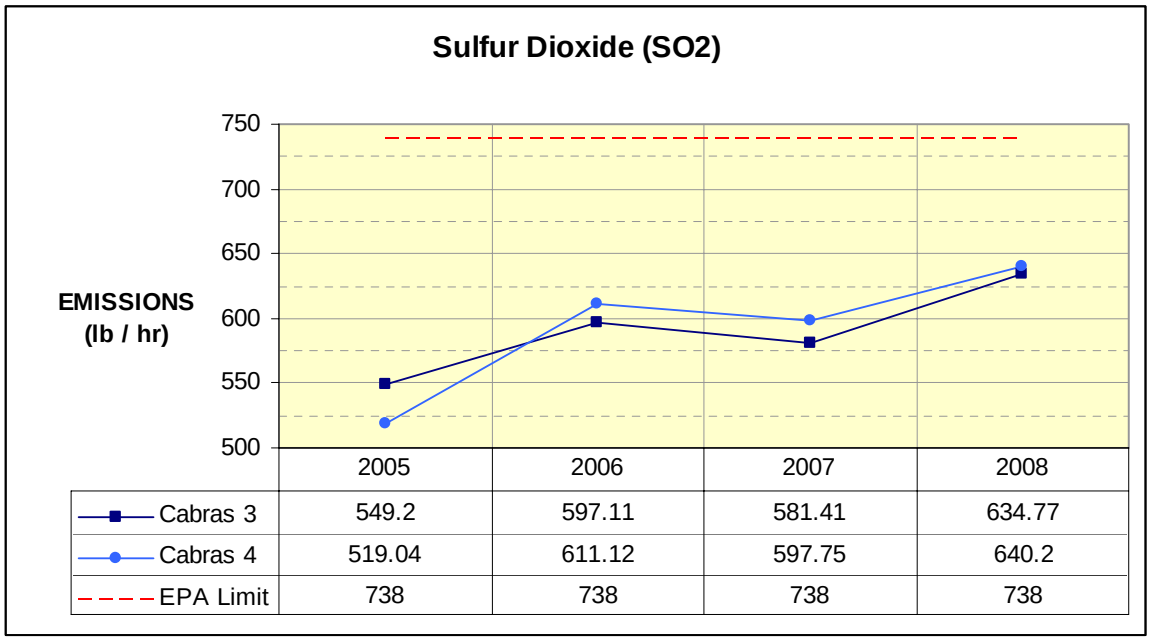


Figure 5. NO_x Emissions

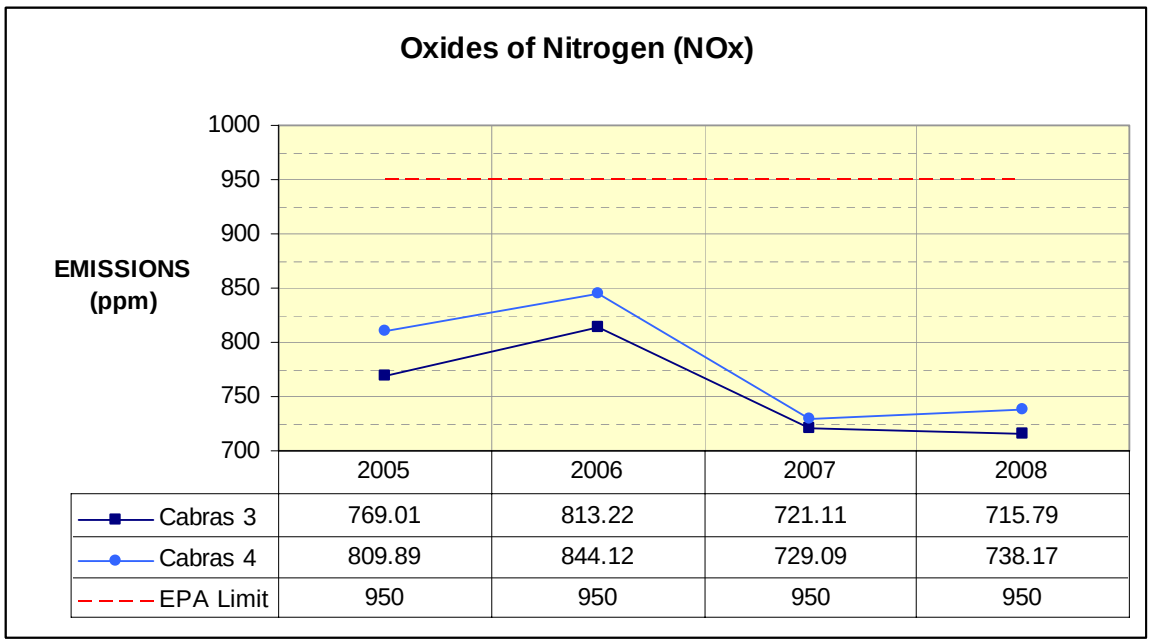


Figure 6. Carbon Monoxide Emissions.

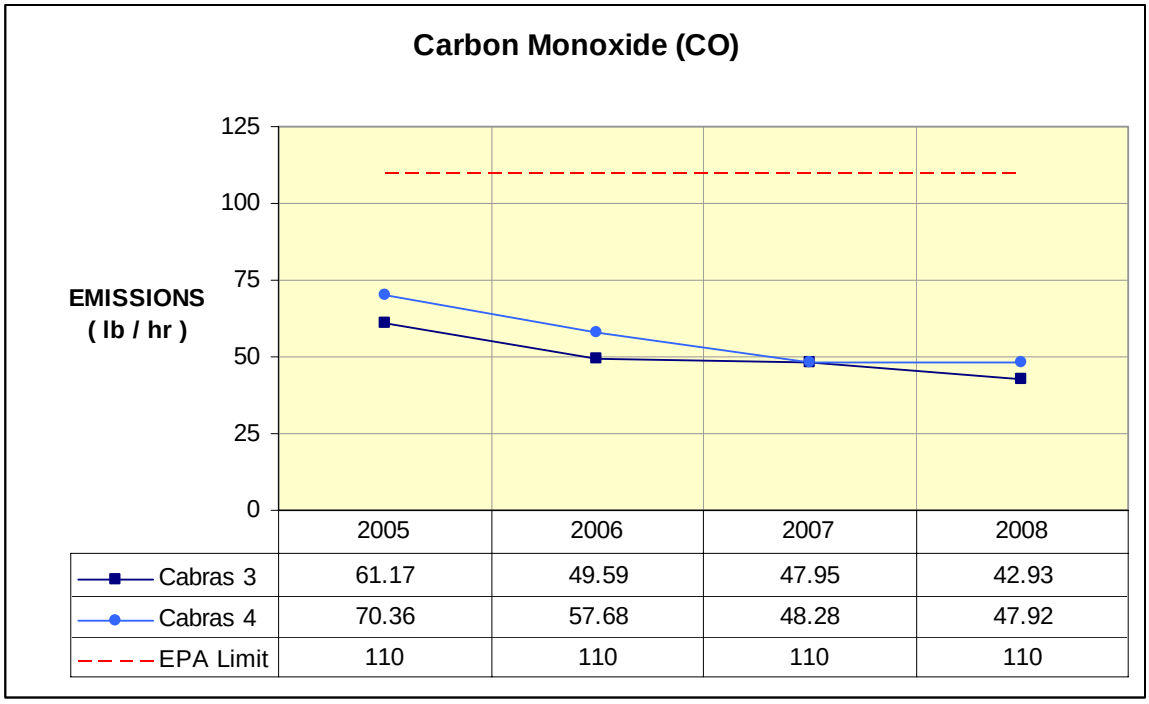


Figure 7. Total Hydrocarbon Emissions.

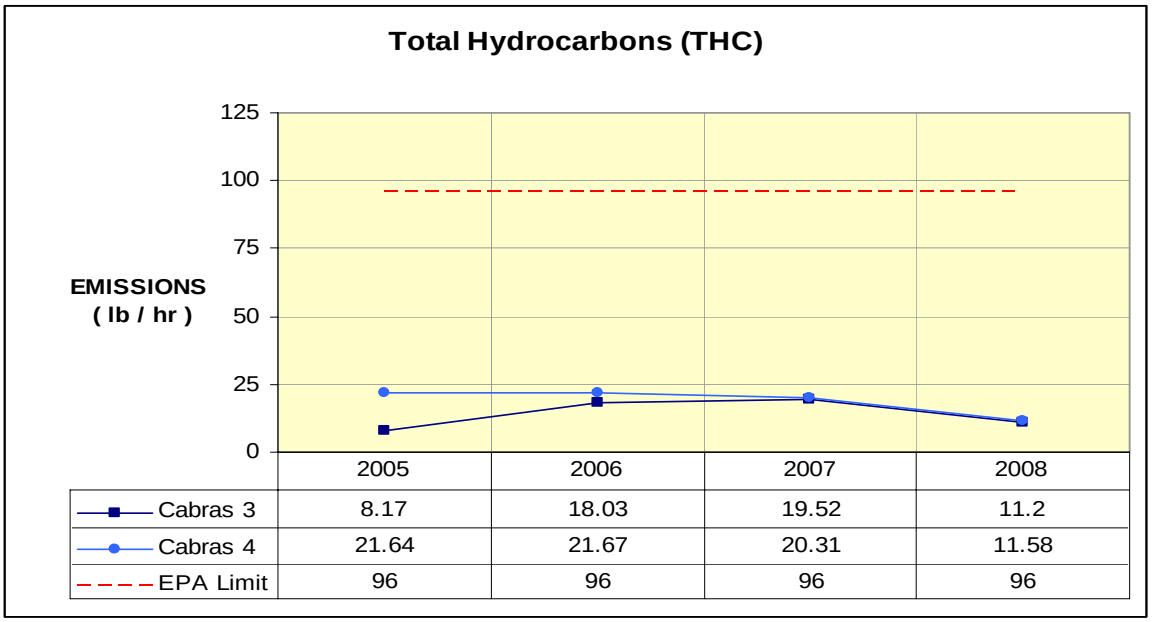
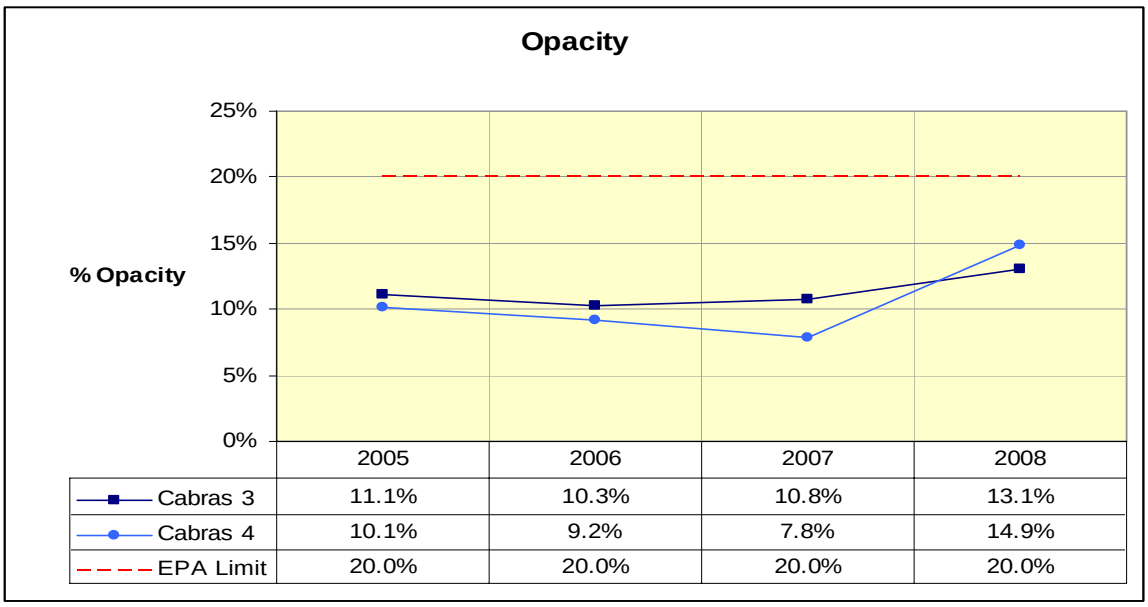


Figure 8. Opacity (%)



	2005	2006	2007	2008
Cabras 3	11.1%	10.3%	10.8%	13.1%
Cabras 4	10.1%	9.2%	7.8%	14.9%
EPA Limit	20.0%	20.0%	20.0%	20.0%

Expectations Assessment:

GPA expects to the succeeding PMC to maintain compliance with the EPA limits, including completion of all necessary activities such as monitoring and equipment maintenance. Any penalties resulting from non-compliance will be the responsibility of the PMC.

5. Operations and Maintenance

5.1. Operational Characteristics

In 1995 and 1996, GPA commissioned two units, Cabras #3 and #4 with installed nameplate capacity ratings of 39.3 MW each. These units used slow-speed diesel technology, which converts fuel into electrical energy. These units burn about 25%-30% less fuel than Cabras #1 and #2 units. The plant is used for baseload operations.

The plant consists of two slow speed diesel generator units:
DIESELS: Hanjung-Man B&W; slow speed; type K80MC-S; 12-cylinder; in-line; 2-cycle; 55060 BHP; 102.9 RPM; fuel #6 RFO
GENERATORS: ABB, SA; type W.950/95/70; 49280 KVA; 0.8 pf; 102.9 RPM; 13.8 kV; 2062 amps; 3 phase wye; 70 poles; air cooled

Primary fuel is Residual Fuel Oil (High Sulfur, #6 RFO), with #2 Diesel fuel for start-up.

5.2. Cabras Operations/Maintenance Practices

5.2.1. Operations and Maintenance Procedures

Description of system & History:

The Cabras maintenance departments rely on the OEM manuals and employee's historical knowledge and learned skills to perform required maintenance activities.

Cabras has Standard Operating Procedures to guide employees through various issues associated with daily production. Many of these procedures are general to the company but a few assist in the day-to-day operation of the plant. A complete listing of these procedures will be made available upon request.

Cabras employees continue to utilize the original Operation Manual, dated July 1974, as provided by Mitsui and Co. Inc., New York, U.S.A. & Tokyo Electric Power Services CO., LTD., of Tokyo, Japan. The manual covers issues such as:

- Starting of unit when Cold, Warm or Hot, with curves and limits
- Continuous operation
- Increasing and decreasing load
- Shutdown of unit
- Plant auxiliaries
- Operator equipment check points and inspections
- Normal operating ranges of temperatures, pressures and flows
- Lead and Lag operations
- Power transformer operation

Needs Assessment:

Operations and Maintenance procedures need to be developed and properly documented to support future operations and maintenance activities.

The PMC is also expected to fully train and develop Cabras 3 &4 Plant Staff in the different O&M functions in support of operational excellence goals. Providing adequate training will also ensure that the staff has sufficient practical and theoretical knowledge for performing tasks required for operating and maintaining the plant, as well as to bridge skill and competency gaps.

5.2.2. Water Production Procedures

Description of system & History:

Cabras 3&4 Plant has a reverse osmosis system installed during the first PMC Contract Period. Literature on the reverse osmosis system may be provided upon request.

Needs Assessment:

Procedures on the Operations and Maintenance of the Reverse Osmosis System , as well as certain water production procedures need to be developed to support future operations activities. All water production procedures will be the property of GPA and transferred to GPA for use, and are to be developed in electronic format such as Microsoft Word.

5.3. Central Support Services

5.3.1. Central Maintenance Capabilities

Description of department & capabilities of personnel: The Central Maintenance department (CM) supports Cabras 1, 2, 3 & 4 in addition to the fleet of combustion turbines and medium speed diesels across the entire island. Central Maintenance has good in-house maintenance capabilities for a plant this size with the following equipment and shop support:

- Three engine lathes capable of turning 40+ inches, 15 feet in length;
- Milling machine;
- Surface grinder;
- A pair of band saws;
- Two drill presses (one large radial and one small);
- Four electric welding machines rated at 300 amps;
- Two portable (diesel powered) welding machines with AD/DC power and compressed air capabilities;
- Plasma cutter;
- Tool storage locks up with various portable hand tools, estimated value approximately $100,000.

The CM department personnel receive their training through on-the-job efforts. There is no formal training or apprenticeship program. The majority of the CM personnel are currently Journeymen mechanics. Currently there is only one Utility Worker position employee in the CM department.

History: the CM department personnel typically have supported the major outages and large equipment repair activities at Cabras such as:

- Air heater basket and seal repairs;
- Boiler welding and repairs;
- Turbine / Generator outages;
- Pump, motors, fans;
- Piping, valves, condenser, feedwater heaters.

The CM department currently has a staff of 14 employees with a Superintendent.

The PMC is highly encouraged to utilize this resource in the interest of cost savings.

5.3.2. Central Planning Capabilities

Description of department & capabilities of personnel: The planner's areas of responsibilities include handling of the mechanical and electrical/instrument work orders, and generating requisitions to order parts and materials required by the plant. Planning meetings for each discipline occurs two to three times a week to review work order backlog, scheduling and work order progress. These meetings typically involve the planner, assistant plant superintendent of maintenance and maintenance supervisors.

Currently, there is one full time dedicated maintenance planner at the Cabras 3 & 4 plant who handles the processing, coordinating, scheduling, closing of maintenance work orders, and ordering of parts and materials.

Needs Assessment: The PMC shall train the Planner as specified in Volume II of this IFB.

5.3.3. Central Warehousing Capabilities

Description of department & capabilities of personnel: The warehouse stores spare and replacement parts and components required for reliable operation of the Cabras facility. One full time employee staffs the warehouse. GPA will continue to provide this person since the warehouse stores parts for other operating units within the GPA system.

Currently there is an estimated total valuation of $1,500,000 in spare parts assigned to the Cabras 3 & 4 plant. An Inventory Listing with Quantities on Hand and Costs may be provided upon request.

5.3.4. Generation Administration Capabilities

Description of department & capabilities of personnel: The Generation Department is located on the Cabras plant property. The group is comprised of one Assistant Manager for Generation, two electrical engineers and one mechanical engineer that support the needs of the power plants.

History: This department's employees handle projects to improve the long term reliability and operation/maintenance of the plant. Department personnel also coordinate with contractors, determine budget inputs, support major outages, monitor heat rate and determine what needs to be accomplished to help the long-term viability of the plant.

5.3.5. Engineering Division Capabilities

Description of department: The Engineering Division is responsible for the overall implementation of new capital improvements projects for the Guam Power Authority. These projects range from multi-million dollar construction projects such as the installation of Cabras 3 & 4 Slow-speed Diesel Plant to the line extensions for individual customer services. Additionally, the Division is responsible for managing the Authority's, Demand Side Management (DSM) program in addition to performing various system planning studies such as the Long Range Transmission Study and the Integrated Resource Plan. Lastly, General Engineering is also

responsible for the overall system protection needs.

The General Engineering Division is comprised of eight sections:

- Engineering Administration;
- Customer Service;
- Distribution;
- Project Management;
- Real Estate;
- Substation / Transmission;

The Division has 35 personnel with varying skill levels from the licensed professional engineers to engineering technicians and the field survey crews.

5.4. Computerized Maintenance Management System (CMMS)

Description of department & capabilities of personnel: In 1997 GPA initiated the implementation of the Computerized Maintenance Management System (CMMS) under the J.D. Edwards (JDE) Financial Management Software for all operations division sections, but primarily for generation, T&D and transportation. Prior to this program, GPA tracked maintenance with a simple database or spreadsheet program, with no standardized maintenance management program in place. History files were not easily accessible and most history resources were retiring. In addition, labor and other project costs tracking became difficult tasks when projects were not setup with appropriate tracking accounts.

The CMMS provided an on-line access to equipment for completed, ongoing and upcoming maintenance work orders with an up to date status. Backlog, project costs and labor tracking were easily available through system reporting. The integrated inventory program allowed parts to be viewed on-line and staged before they were to be picked up from the warehouse. The CMMS also provided the capability of downloading system data onto a spreadsheet to graph equipment readings or test results for trending analysis.

Formal and onsite CMMS training has been conducted to all positions at Cabras for work order entry and backlog review. For other positions a more detailed training was provided for adding labor routing and parts, plus the closing of work orders.

A computer network was developed to provide access to the CMMS as well as the financial management system. This allows for system access in almost all plant office areas. In the Cabras plant, there are 15 computers and one network printer, which all access the JDE system. Nine computers and one network printer are located in the Administrative Offices on the first floor. One computer is located in the control room on the second floor. Three computers and one printer are located in the Electrical/Instrument shop on the third floor. Two computers and one printer are located in the plant maintenance shop, on the northeast side of the plant.

The CMMS still has a number of pending installations for the JDE system as well as equipment nameplate data to be input. This includes the integration of the spare parts component listing and inventory identification. In order to complete this, a component parts list must be developed for all major/critical equipment and matched with inventory part numbers. Additionally, the inventory items should be reviewed and obsolete items cleared out of the warehouse inventory system. This will be a large undertaking but is required for proper material management and control.

The payroll module has not been integrated with the CMMS module either. This requires all actual labor hours to be manually inputted into each work order as opposed to an automatic CMMS update from the payroll module. Presently, actual hours are being entered against work orders in the payroll time entry and this information can be reported through a custom made report.

5.5. Plant Organization

The plant organization chart is in Appendix H.

5.6. Operations Department

5.6.1. Control Center Operators

Description of Department Structure & Capabilities: The CCO's are responsible for bringing the units up and down, or, on and off-line as requested by the system dispatch operators and ensuring the safe and reliable operation of the major and auxiliary equipment of the plant. Specific job duties are described in the GPA position descriptions. These descriptions will be made available at the plant indicative proposal and plant tour meetings.

Formal Training summary: There is no formal documented training program for the CCO's. CCO's receive on the job training from other GPA employees who have established the required skills to perform the work requirements.

5.6.2. Diesel Plant Operator / Maintenance Worker I & II

Description of Department Structure & Capabilities: The DPO/Maintenance Workers are responsible for operating all the equipment outside the control center area. These operators inspect, operate and turn on and off the auxiliary equipment to the engine as requested by the CCO and ensure the safe and reliable operation of the major and auxiliary equipment of the plant. Specific operational duties are described in the Operation Manual for Cabras Slow Speed Diesel Power Plant. Specific job duties are described in the GPA position descriptions. These descriptions will be made available at the plant indicative proposal and plant tour meetings.

Formal Training summary: A training program was developed by Burnmeister and Wain Scandanvian during the initial GPA operation of the plant. Personnel trained during this time have since resigned, however the training course manuals are available.

5.7. Maintenance Department

5.7.1. Mechanical Maintenance Employees

Description of Department Structure & Capabilities: The mechanical maintenance employees (MME) work a normal eight-hour day shift, Monday through Friday. No second or third shift exists, and any work beyond the basic shift requires over time or the possibility of changing shift schedules within the pre-established work rules. Mechanical maintenance employees provide repair services of the mechanical nature to all the plant equipment as required. They also help to ensure the safe and reliable operation of the major and auxiliary equipment of the plant. Specific maintenance duties are described in the GPA established position descriptions for Cabras Slow Speed Diesel Power Plant. GPA will provide these descriptions.

Formal Training summary: There is no formally documented, on-going training program for the MME's. MME's receive on-the job training from other GPA employees who have established the required skills to perform the work requirements.

5.7.2. Electrical Maintenance Employees

Description of Department Structure & Capabilities: The electrical maintenance employees (EME) work a normal eight-hour day shift, Monday through Friday. No second or third shift exists, and any work beyond the basic shift requires over time or the possibility of changing shift schedules within the pre-established work rules. Electrical maintenance employees provide repair services of the electrical nature of all the plant equipment as required. They also help to ensure the safe and reliable operation of the major and auxiliary equipment of the plant. Specific maintenance duties are described in the GPA established position descriptions for Cabras Slow Speed Diesel Power Plant. These descriptions will be made available.

Formal Training summary: There is no formal documented training program for the EME's. EME's receive on-the job training from other GPA employees who have established the required skills to perform the work requirements.

5.7.3. Instrument & Control Maintenance Employees

Description of Department Structure & Capabilities: The Instrument and Control (I&C) maintenance employees work a normal eight-hour day shift, Monday through Friday. No second or third shift exists, and any work beyond the basic shift requires over time or the possibility of changing shift schedules within the pre-established work rules. I&C maintenance employees provide repair services to the instrument and control nature of all the plant equipment as required. They also help to ensure the safe and reliable operation of the major and auxiliary equipment of the plant. Specific maintenance duties are described in the GPA established position descriptions for the Cabras Slow Speed Diesel Power Plant. These descriptions will be made available at the plant indicative proposal and plant tour meetings.

Formal Training summary: There is no formally documented, on-going training program for the I&C's. I&C's receive on-the job training from other GPA employees who have established the required skills to perform the work requirements

5.8. Training

Hanjung, the construction contractor, and Burnmeister and Wain Scandinavian (BWSC), the contractor hired to develop the training courses for the plant, conducted formal training of GPA personnel during plant commissioning and turnover. Since these initial trainings, other trainings conducted were mainly on-the-job training during regular operations and scheduled/unscheduled maintenance for existing and new employees. Most of the original staffing employed with GPA during the time of the construction turnover and the BWSC training are no longer with the Authority.

Formal training will need to be addressed during the PMC contract as a Performance Improvement Project initially and then incorporated into the O&M expense. This is to ensure that all employees are performing their operational and maintenance duties at the most effective and efficient processes, as well as to understand the reasoning and consequences for any and all actions related to the operation and maintenance of these of these units. A training assessment and plan should be developed to identify skills and needs.

5.8.1. BWSC – GPA Training Manuals

During commissioning of the Cabras 3&4 Plant (1996/1997), GPA contracted Burnmeister and Wain Scandanavian to develop a training package specifically designed for the operation and maintenance of the Cabras 3 and 4 units and provide instruction to GPA employees.

The training package included 11 courses that were provided in separate binders located in the Generation Administration building. The course binders contain course outlines, identifying target personnel, operational and maintenance instruction overviews, as well as reference diagrams/drawings. Other topics included operation and maintenance safety of equipment, how to read manuals and interpret drawings, and general overviews of equipment.

The course binders are to be used in developing a training plan and schedule. The following is a listing of course titles that are available:

Course #1 – Basic Operational Principles
Course #2 – Operation Procedures
Course #3 – Maintenance of Electrical Equipment:
Course #4 – Maintenance of Mechanical Equipment
Course #5 – The Control System
Course #6 – Operation and Maintenance of Oil Separators
Course #8 – The 8000 Hours Overhaul
Course #9 – Performance Evaluation
Course #10 – Engine Lubricants
Course #11 – Fuel Oil

5.8.2. Apprenticeship Program

GPA has recently re-established the Apprenticeship Program for technical and skilled positions, which include Substation Electricians, Steam Power Plant Operators, Instrument Technicians, Line Repairman, and Electric Meter Repair. Federal approval through the Department of Labor has recognized GPA by certifying the Authority as an Apprentice Training organization.

The Apprenticeship Program was recreated to address concerns of the increasing resignations and retirement of technical and skilled employees of the Authority and the lack of the equivalent capacity in local labor force. The program is slated to begin mid-February. Candidate testing, interview and selections have already concluded.

For Cabras 3&4 Power Plant, the Instrument Technician is the only apprentice position available at this time. Training will include theoretical training through a local vocational school and on the job site as well as hands-on or on-the-job training for shop and field practice of various types of instrumentation equipment, including calibration and measuring devices. This is a four-year program that will certify, after successful completion of school courses and OJT hours, the apprentice as a journeyman technician.

5.8.3. Trainings Completed

The following trainings were completed during the PMC period:

- Woodward Governor Training
- MAN B&W Diesel Engine Training
- Doosan Engine Factory Training
- Bearing Temperature Monitoring System Training
- ABB TurboCharger Training
- Alfa Laval Purifier Training

Needs Assessment: Volume II of this IFB illustrates the training requirements that would be required for the next PMC period. Training requirements include the maintenance of a "skills check-out book" to monitor the training progress of each employee.

5.9. Capital and O&M Performance Improvement Projects

The following tables summarize the proposed Cabras 3 & 4 Capital Improvement Projects, Plant Improvement Projects, and Performance Improvement Projects for the following five years:

Table 33. CIP / PIP / O&M Project Listing

	FY	TITLE	DESCRIPTION
		STRUCTURES AND IMPROVEMENTS	
1	2009	Slide Fuel Valve Retrofit	Involves the installation of new valves that eliminate residual fuel left in the atomizer after combustion. It is expected that this upgrade will increase fuel efficiency of the engines by 1% and reduce emissions to save approximately $300,000.00 per year in fuel costs.
2	2009	Governor Control System Upgrade	Upgrade existing Woodward Governor Control System to allow for communication between Cabras 3 and Cabras 4 Units.
3	2009	New Main Lube Oil Motor	Purchase of a new Main Lube Oil Motor to increase reliability of plant. The Main Lube Oil Motor is necessary to supply Engine with proper lubrication for operation.
4	2009	New Air Cooler Elements	Purchase two sets new Air Cooler Elements to replace original that have surpassed life expectancy, necessary for the proper cooling of combustion air for efficient operation of the engines.
5	2009	Sea Water Traveling Screen C Upgrade	Upgrading of the existing Traveling Screens to complete Stainless Steel construction to mitigate damages and effect of corrosive seawater environment.
6	2009	New Battery Bank "C"	Existing bank now poses safety hazard due to leaking battery terminals and degraded condition. Battery Bank is required to maintain operation of critical instrumentation in DC mode during power fluctuations, improving plant reliability.
7	2009	New Upgraded Homogenizer	Installation of 1 set of CD-WiDE Homogenizer System. The new homogenizer will provide the plant with a more reliable, easily maintained homogenizer with access for controls directly from the control room, and will become second homogenizer for the plant.
8	2009	Upgrade of PIE Shop Awning to concrete roofing.	The project will allow for the construction of a concrete roof over the balcony to mitigate any effects of Cabras 1&2 industrial fallout while allowing safe and proper workspace for Plant Instrument & electrical staff.
9	2009	Fire Alarms / Suppression System Upgrade (Phase 1 A/E Development)	The plant existing Fire Alarm / Suppression System has been out of operation for several years and is in need of upgrading to a more comprehensive system that includes the transformer sprinkler system and heater room fire suppression based on GPA's Fire Alarm Project that was partially completed.
10	2009	Plant Security Surveillance System	Due to some experiences of theft and missing tools over the past two years, it has been deemed necessary to install security surveillance cameras in the offices and storage areas. Additional units will be added to allow for Engine Monitoring to identify problems and leaks more quickly, to reduce cleanup costs.

	FY	TITLE	DESCRIPTION
11	2009	Fuel Grinding Pumps	Installation of 3 sets of CD-SR System (Sludge Reducer Grinding Pumps) on the inlet to each F.O. Purifier. These specialized pumps are designed to grind/process incoming heavy fuel oil and reduce sludge development by approximately 80%. The reduction in sludge will increase the amount of useable F.O. for Cabras 3&4, reduce workload on F.O. Purifiers, and reduce the amount of sludge purged as waste.
14	2009	Bilge Pump Upgrade of Oil Water Separators	
16	2009	Flow Meters with Strainers (Day Tank Suction Line)	
17	2009	Construction of New Storage Building	
18	2010	Fire Alarms/Suppression System Upgrade (Phase 2 Construction)	Upgrade of the Fire Protection and Fire Fighting system to improve plant personnel & equipment safety.
19	2010	Smokestack Structure repair and remediation, Phase 2	To ensure safety of personnel and continued operation of engine exhaust gas system. Phase II Implementation of repair and remediation procedures developed during A/E evaluation of Smoke Stack structure.
20	2010	Installation of new Homogenizer	To complete the installation of a secondary homogenizing system for both units providing the plant with more reliable, easily maintained homogenizers with direct access for controls.
21	2010	Upgrade Fuel Oil Purifier HeatPac Controls	
22	2010	Installation of Additional F.O. Purifier Unit	
23	2010	Installation of Vent Fans for Turbochargers	Install Air Ducting to the Turbochargers from a supply fan to lower incoming air temperatures, reduce debris entering the silencers and increase turbocharger efficiency by 0.5-1%,
24	2010	Upgrade modification of Fuel Pump Housings, Phase I	Phase 1 of 4 - existing fuel pump housings will be modified to repair significant wear down, to incorporate wear sleeve/liner. This will also eliminate fuel leaks.
25	2010	New Hydraulic Press for Waste Oil Recovery	
26	2010	Upgrade of Cylinder Heads, Phase I	Phase 1 of 4 - reconditioning of cylinder heads and upgrading of the surface coating with more resilient material, to reduce amount of wear in the burnout area and extend the mean time between reconditioning requirements.
27	2010	Replacement of Cylinder Liner	Phase 1 of 4 - 6 new cylinder liners will be purchased to ensure optimal performance of engines and increase reliability by protecting against damages to piston rings during operation. Replacement will be phased in over 4 years until all 24 lines have been replaced.
28	2010	Engine Bearing Renewal Phase I	Phase 1 of 2 - trending analysis shows clearance measurements on main bearings, crankpin bearings and crosshead bearings are nearing end of expected service life. This project will incorporate replacement of 12 sets of bearings to allow for the continued optimal operation of units and safety of engine assembly.

	FY	TITLE	DESCRIPTION
29	2010	Sea Water Traveling Screen C Upgrade	Upgrade to Stainless Steel to mitigate damages and effects of corrosive sea water environment
30	2010	Piston Cooling Pipe, Upgrade	Upgrade piston cooling pipe to include flex joint, to mitigate vibration damage on piping system that caused leaks and unplanned shutdowns for repair. This will increase unit reliability and availability.
31	2010	Fuel Oil Inlet Pipe Upgrade	Upgrade fuel oil inlet piping to include flex joint, to mitigate vibration damage on piping system that caused leaks and unplanned shutdowns for repair. This will increase unit reliability and availability.
32	2010	Upgrade of Air Cooler Casing, Phase I	To increase reliability and availability of engines by mitigating leaks and damages experienced by air coolers.
33	2010	New Air Cooler Elements, Phase I	Replacement over a period of 3 years necessary for the proper cooling of combustion air for efficient operation of the engines.
34	2011	Installation of Larger Vent Fan for Fuel Oil Treatment House	Existing system is insufficient and contributes to electrical problems on Fuel Purifier Equipment and unsafe air and temperature conditions. Project will increase air flow through Fuel treatment House to increase cooling of electrical equipment, and improve safety during maintenance work performance.
35	2011	Upgrade of Fuel Oil Purifier Feeder Pumps	Upgrade to new pump type available to increase reliability of fuel purification system by allowing repairs to be made more quickly. Current pumps are obsolete and difficult to repair due to unavailable parts.
36	2011	Upgrade modification of Fuel Pump Housings, Phase II	Phase 2 of 4 - existing fuel pump housings will be modified to repair significant wear down, to incorporate wear sleeve/liner. This will also eliminate fuel leaks.
37	2011	Replacement of Cylinder Liner Phase II	Phase 2 of 4 - 6 new cylinder liners will be purchased to ensure optimal performance of engines and increase reliability by protecting against damages to piston rings during operation. Replacement will be phased in over 4 years until all 24 lines have been replaced.
38	2011	Upgrade of Cylinder Heads, Phase II	Phase 2 of 4 - reconditioning of cylinder heads and upgrading of the surface coating with more resilient material, to reduce amount of wear in the burnout area and extend the mean time between reconditioning requirements.
39	2011	Engine Bearing Renewal Phase II	Phase 2 of 2 - trending analysis shows clearance measurements on main bearings, crankpin bearings and crosshead bearings are nearing end of expected service life. This project will incorporate replacement of 12 sets of bearings to allow for the continued optimal operation of units and safety of engine assembly.
40	2011	Upgrade of Air Cooler Casing, Phase II	To increase reliability and availability of engines by mitigating leaks and damages experienced by air coolers.
41	2011	New Air Cooler Elements, Phase II	Replacement over a period of 3 years necessary for the proper cooling of combustion air for efficient operation of the engines.

	FY	TITLE	DESCRIPTION
42	2011	Repair of Exhaust gas Silencer Insulation	Re-insulation and installation of new lagging on the exhaust gas ducting located near smoke stack, which was damaged during previous typhoons.
43	2011	Renewal of Exhaust Valve Actuators	Phase 1 of 4 - replacement will help increase reliability and availability by mitigating downtime caused by failure of actuators in service.
44	2011	Modification of L.O. Sludge Pump	
45	2011	Modification of F.O. Injection Pumps	
46	2011	New Battery Bank "B"	
47	2011	Sea Water Traveling Screen A/B Upgrade	
48	2011	Construction of Parts Cleaning Room	
49	2012	Painting of Power House	Painting of the Cabras 3&4 Power House Exterior.
50	2012	Upgrade modification of Fuel Pump Housings, Phase III	Phase 3 of 4 - existing fuel pump housings will be modified to repair significant wear down, to incorporate wear sleeve/liner. This will also eliminate fuel leaks.
51	2012	Replacement of Cylinder Liner Phase III	Phase 3 of 4 - 6 new cylinder liners will be purchased to ensure optimal performance of engines and increase reliability by protecting against damages to piston rings during operation. Replacement will be phased in over 4 years until all 24 lines have been replaced.
52	2012	Upgrade of Cylinder Heads, Phase III	Phase 3 of 4 - reconditioning of cylinder heads and upgrading of the surface coating with more resilient material, to reduce amount of wear in the burnout area and extend the mean time between reconditioning requirements.
53	2012	Upgrade of Air Cooler Casing, Phase III	To increase reliability and availability of engines by mitigating leaks and damages experienced by air coolers.
54	2012	New Air Cooler Elements, Phase III	Replacement over a period of 3 years necessary for the proper cooling of combustion air for efficient operation of the engines.
55	2012	Upgrade of Sea Water Inlet Header	Upgrade to stainless steel to increase reliability of cooling system by eliminating leaks that cause additional maintenance requirements. Leaks are due to heavy corrosion due to seawater and environmental conditions.
56	2012	Renewal of Exhaust Valve Actuators	Phase 2 of 4 - replacement will help increase reliability and availability by mitigating downtime caused by failure of actuators in service.
57	2012	Replacement of Fuel Oil Circulating Pipe (Cylinder Head Side, 1 unit)	Replace Existing Fuel Oil Circulating Pipe located on the engine from the fuel pump to the cylinder head that are currently experiencing corrosion and erosion due to continued operation with emulsified fuel.
58	2012	Upgrade of Turbochargers	Upgrade to newer ABB or MAN types that have higher efficiency rating, and utilize existing engine oil supply. This will eliminate need for a separate oil type at an addition O&M expense.

	FY	TITLE	DESCRIPTION
59	2012	Installation of Air Supply Fan for Turbochargers	
60	2013	Renewal of Fuel Oil High Pressure Injection Pipes (24 sets)	Replacement due to wear down caused by continued operation with emulsified fuel. This will increase availability by eliminating shutdowns caused by heavy oil leaks experienced on these pipelines.
61	2013	Upgrade modification of Oil Water Separators	Upgrade to increase processing capacity and filtering capabilities, for more effective waste disposal.
62	2013	Upgrade modification of Fuel Pump Housings, Phase IV	Phase 4 of 4 - existing fuel pump housings will be modified to repair significant wear down, to incorporate wear sleeve/liner. This will also eliminate fuel leaks.
63	2013	Replacement of Cylinder Liner Phase IV	Phase 4 of 4 - 6 new cylinder liners will be purchased to ensure optimal performance of engines and increase reliability by protecting against damages to piston rings during operation. Replacement will be phased in over 4 years until all 24 lines have been replaced.
64	2013	Upgrade of Cylinder Heads, Phase IV	Phase 4 of 4 - reconditioning of cylinder heads and upgrading of the surface coating with more resilient material, to reduce amount of wear in the burnout area and extend the mean time between reconditioning requirements.
65	2013	Renewal of Exhaust Valve Actuators	Phase 3 of 4 - replacement will help increase reliability and availability by mitigating downtime caused by failure of actuators in service.
66	2013	Replacement of Fuel Oil Circulating Pipe (Cylinder Head Side, 1 unit)	Replace Existing Fuel Oil Circulating Pipe located on the engine from the fuel pump to the cylinder head that are currently experiencing corrosion and erosion due to continued operation with emulsified fuel.
67	2013	Piston Crown Upgrade Phase I	To Increase availability of the unit by reducing amount of wear experienced on piston ring grooves.
68	2014	Installation of Economizer System	To utilize engine exhaust gas to operate boiler system. Products from boiler system will be used to accommodate various heating requirements around the plant currently supplied by electric heaters. This will increase efficiency of plant by reducing station power requirements and electrical loads.
69	2014	Modification of Air Cooler Covers	To reduce number of susceptible locations in which leaks can occur, and reduce frequency of leaks.
70	2014	Piston Crown Upgrade Phase II	To Increase availability of the unit by reducing amount of wear experienced on piston ring grooves.
71	2014	Renewal of Exhaust Valve Actuators	Phase 4 of 4 - replacement will help increase reliability and availability by mitigating downtime caused by failure of actuators in service.
72	2013/ 2014	Installation of Heat Recovery System	

	FY	TITLE	DESCRIPTION
		TRANSPORTATION EQUIPMENT	
	2010	New Vehicle Purchase to replace Plant Official	
		POWER OPERATED EQUIPMENT	
	2011	Upgrade of Plant Lighting Transformer	
		COMMUNICATION EQUIPMENT	
	2010	Upgrade Plant PA System	

6. Historic Spending Patterns

The following is the historical spending data from FY 2005 thru FY 2008 for the Cabras 3&4 Power Plant.

Object Code	DESCRIPTION	FY 2005	FY 2006	FY 2007	FY 2008
1	Regular pay	$751,992	$828,838	$694,686	$788,043
2	Overtime	$96,850	$100,505	$138,650	$197,833
3	Premium pay	$24,208	$24,347	$26,475	$30,068
4	benefits	$301,905	$305,575	$323,882	$335,788
6	Sick Leave	$17,525	$49	$51,238	$35,871
7	Holiday pay			$33,481	$38,401
9	Labor-Hazard				
15	Heavy Equipment			$3,790	$4,270
17	Other Rental				
25	Technical Service	$38,685	$71,465	$32,012	$112,041
26	EPA	$101,274	$70,730	$127,381	$51,835
27	Other professional services				
28	Building Maintenance	$148,436			
33	Maintenance of Accessory Equipment	$139,995	$128,204	$177,608	$93,706
35	Other Maintenance		$351,402	$432,260	$526,961
37	Postage		$98	$107	$92
38	Water				
39	Telephone-local				
40	Telephone-overseas	$6,199	$8,526	$8,239	$8,166
42	Courier services	$10,989	$2,995	$8,715	$16,310
43	Maint of Structure	$0			
44	Parts				
45	Regular pay				
46	Accessory Equipment	$75,318	$134,493	$157,906	$131,925
47	Turbine Plant Parts	$284,634	$56,100	$0	$255,397
48	EPA & Others		$46,799	$12,500	
55	Other parts				
56	Chemicals	$31,699	$38,781	$28,910	$23,951
57	Gases				
58	Lubrications	$8,800	$74,924	$116,116	$182,979
62	Other materials	$47,587	$303,688	$403,684	$211,509
64	Janitorial supplies				
65	Office Supplies	$5,057	$14,471	$16,731	$16,982
66	Safety Supplies	$4,997	$5,004	$4,579	$5,783
68	Xerox Supplies				
69	Uniforms, Coveralls	$9,571	$4,082	$7,275	$280
70	Tools	$19,955	$2,995		$370
72	D. Water	$3,495	$4,394	$4,792	$4,816

Object Code	DESCRIPTION	FY 2005	FY 2006	FY 2007	FY 2008
77	Others	$0			
81	Training & materials		$107,706	$31,235	$9,200
83	Lube oil	$0	$0	$0	
85	Labor cost charged to W. O.			$0	
95	Overhead Allocations	$0	$0	$0	
TOTAL O& M EXPENSES (Object Codes 15-95)		**$ 936,692**	**$ 1,426,858**	**$ 1,573,839**	**$ 1,656,572**
CIP/PIP EXPENDITURES		**$1,427,603**	**$,604,220**	**$ 182,514**	**$ 979,842**
FIXED MANAGEMENT FEE		**$ 615,000**	**$ 1,334,045**	**$ 1,295,408**	**$ 1,416,595**

Historic costs for Water Expenses and Environmental Compliance fees will be provided by GPA.

7. Plant Documentation Summary

The following is a list of supporting documents and drawings for this technical review. The Plant Diagrams and General Arrangement Drawings are provided in this IFB.

PLANT DIAGRAMS		CABRAS 3 Drawing No.	CABRAS 4 Drawing No.
1	Symbol & Legend (1)	-	A-3938-201
2	Symbol & Legend (2)	-	A-3938-202
3	Symbol & Legend (3)	-	A-3938-203
4	Symbol & Legend (4)	-	A-3938-204
5	Sea Water Cooling System	A-3926-211	A-3938-211
6	Low Temperature Cooling Water System	A-3926-212	A-3938-212
7	High Temperature Cooling Water System	A-3926-213	A-3938-213
8	Compressed Air System	A-3926-214	A-3938-214
9	Waste Water System	A-3926-221	A-3938-219
10	Fire Water System (1)	A-3926-222	A-3938-221
11	Fire Water System (2)	A-3926-223	A-3938-222
12	Fire Protection Gas (CO2) System	A-3926-224	A-3938-223
13	HVAC System (1)	A-3926-225	A-3938-224
14	HVAC System (2)	A-3926-226	A-3938-225
15	Cleaning & Drain System	A-3926-227	A-3938-220
16	Fuel Oil System	A-3926-228	A-3938-226
17	Lube Oil System (Rev. 2)	A-3926-229	-
18	Lube Oil System (Rev. 3)	A-3926-229	A-3938-227
19	Intake Air/ Exhaust Gas System	A-3926-230	A-3938-228
21	Fresh/Demi Water System	A-3926-232	A-3938-229
GENERAL ARRANGEMENT DRAWINGS		**CABRAS 3 Drawing No.**	**CABRAS 4 Drawing No.**
1	Plant Layout	A-3926-301	A-3938-401
2	G.A. - Power House, Ground Floor	A-3926-302	A-3938-402
3	G.A. - Power House, Mezz. Floor	A-3926-303	A-3938-403
4	G.A. - Power House, Mech. Floor	A-3926-304	A-3938-404
5	G.A. - Power House, Operating Floor	A-3926-305	A-3938-405
6	G.A. - Power House, Section "A-A"	A-3926-306	A-3938-406
7	G.A. - Power House, Section "B-B"	A-3926-307	A-3938-407
8	G.A. F.O. Treatment House, Plan & Sect.	A-3926-308	-
9	G.A. Emulsion Wtr. Treatment House Plan & Sect.	-	A-3938-408
10	G.A. Outdoor Area Equip. Plan	A-3926-310	A-3938-409
11	G.A. Sea Water Intake Area	A-3926-311	A-3938-410
12	G.A. Power House, Outdoor Area Plan	A-3926-312	A-3938-411

For Performance Test Results and Training Manuals, copies may be provided upon request.

	PERFORMANCE TEST RESULTS	DATE
1	2005 Performance Test Results	Mar. 2005
2	2006 Performance Test Results	Mar. 2006
3	2007 Performance Test Results	Mar. 2007
4	2008 Performance Test Results	Mar. 2008
5	2009 Performance Test Results	Apr. 2009

*Graphs of Performance Test results are provided in the sections above.

	GPA-BWSC TRAINING COURSE OVERVIEW	COURSE NO.
1	Basic Operational Principles	1
2	Operation Procedures	2
3	Maintenance of Electrical Equipment	3
4	Maintenance of Mechanical Equipment	4
5	The Control System	5
6	Operation and Maintenance of Oil Separators	6
7	The 8000 Hours Overhaul	8
8	Performance Evaluation	9
9	Engine Lubricants	10
10	Fuel Oil	11