GUAM EPA
TITLE V FEDERAL OPERATING PERMIT
STATEMENT OF BASIS

Guam Power Authority
Dededo Power Generating Facility

Permit No. FO-003

Facility ID:	FO-003
Facility Name:	Guam Power Authority – Dededo
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I. Purpose

The purpose of this engineering evaluation is to identify all applicable requirements, determine if the facility will comply with those applicable requirements, and provide the legal and factual basis for proposed permit conditions.

II. Facility Location

The Guam Power Authority Dededo facility is located on Marine Drive in Dededo, Guam.

III. Description of Facility Operations

The facility is a combustion turbine and diesel electric generator power generating plant. The operation of this facility helps alleviate load shedding on the island during outages of other power generating facilities. Activities that have the potential to cause significant emissions of air pollutants primarily result from two 23 megawatt (MW) combustion turbine electric generators, four 2.5 MW diesel electric generators, a 1.2 MW black start diesel generator, and two 150,000 gallon diesel fuel oil storage tanks. Other insignificant emission sources include two 40,000 gallon fuel oil storage tanks, two 1,700 gallon lube oil storage

tanks, four 500 day tanks, two 5,000 gallon transformer storage tanks, a 100 gallon fire pump day tanks, and a 300 gallon black start generator day tank.

IV. Equipment Listing and Permitting History

IV.A. Significant Emission Units

A listing of all permitted equipment at the facility is presented in the table below. This table also includes the Guam EPA (GEPA) permit number for those emission units with existing permits. The conditions from these permits have been incorporated into the Title V permit, which supercedes the existing GEPA permits.

Emission Unit Number	Unit Description	Associated Control Equipment	Guam EPA Permit Number	USEPA PSD Permit Number
CT-1	23 MW combustion turbine electric generator	Water injection system	GPA-689	GU 92-01
CT-2	23 MW combustion turbine electric generator	Water injection system	GPA-689	GU 92-01
DEG-1	2.5 MW diesel electric generator	N/A	GPA-689	GU 92-01
DEG-2	2.5 MW diesel electric generator	N/A	GPA-689	GU 92-01
DEG-3	2.5 MW diesel electric generator	N/A	GPA-689	GU 92-01
DEG-4	2.5 MW diesel electric generator	N/A	GPA-689	GU 92-01
BSG	1.2 MW black start diesel generator	N/A	N/A	GU 92-01
FODT-1	150,000 gallon diesel fuel oil storage tank	N/A	N/A	N/A
FODT-2	150,000 gallon diesel fuel oil storage tank	N/A	N/A	N/A

IV.B. Insignificant Emission Units

The following list of insignificant activities provided by the applicant in the permit application for this facility has been approved by GEPA. This equipment is not exempt from facility-wide requirements.

Description of Activities or Emission Units
Two 40,000 gallon diesel fuel oil storage tanks
Two 1,700 gallon lube oil tanks
Four 500 gallon day tanks
Two 5,000 gallon transformer storage tanks
100 gallon fire pump day tank
300 gallon black start generator day tank

V. Potential to Emit

The annual potential to emit for each significant emission unit is presented below.

Emission Unit	Potential to Emit (tons/year)						
	NO_x	**VOC**	**SO_2**	**PM_{10}**	**CO**	**Lead**	**HAP**
CT-1	363.54	17.52	954.84	86.72	91.98	2.20×10^{-2}	2.02
CT-2	363.54	17.52	954.84	86.72	91.98	2.20×10^{-2}	2.02
DEG-1	1,401.60	12.62	252.29	140.16	119.16	--	0.22
DEG-2	1,401.60	12.62	252.29	140.16	119.16	--	0.22
DEG-3	1,401.60	12.62	252.29	140.16	119.16	--	0.22
DEG-4	1,401.60	12.62	252.29	140.16	119.16	--	0.22
BSG	12.83	0.36	2.43	0.23	3.41	--	6.31×10^{-3}
FODT-1	--	0.29	--	--	--	--	5.35×10^{-4}
FODT-2	--	0.29	--	--	--	--	5.35×10^{-4}
TOTAL	**6,346.3**	**86.5**	**2,921.3**	**734.3**	**664.0**	**4.40×10^{-2}**	**4.94**

VI. Guam Requirements

The following table lists the applicable requirements from the Guam Air Pollution Control Standards and Regulations (GAPCSR) and from the approved Guam State Implementation Plan (SIP). For rules where an applicability determination was required, a discussion is included below.

Section 1103.2	Guam Ambient Air Quality Standards
Section 1103.3	Visible Emissions
Section 1103.4	Fugitive Dust
Section 1103.10	Sulfur Oxides from Fuel Combustion
Section 1103.11	Open Burning

Section 1103.12	Control of Odors in Ambient Air
Section 1103.13	Asbestos
Section 1104	Permit Program Regulations
SIP, Section 7.5	Particulate Emissions from Fuel Combustion

VI.A. Particulate Matter (PM) Limits for Fuel Burning Equipment

Section 7.5 of the GEPA SIP requires that for fuel burning equipment between 1 MMBtu/hr and 1,000 MMBtu/hr in size, the allowable particulate emissions shall be calculated using the following equation:

$$Y = 1.02\ X^{-0.231}$$

Where:
Y = Allowable particulate emission rate (lb/MMBtu)
X = Operating rate (MMBtu/hr)

Assuming an engine efficiency of 40%, and using a conversion factor of 3.41 MMBtu/hr per MW, this limit would be required for engines between 0.12 MW and 117 MW. Therefore, the combustion turbines (Units CT-1 and CT-2), the diesel engine generators (Units DEG-1, DEG-2, DEG-3, and DEG-4), and the black start diesel generator (Unit BSG) are subject to this limit. The allowable PM emission rate for each unit must be determined by the permittee depending on the operating load for each unit.

VII. Federal Requirements

The following table lists the applicable requirements from United States Environmental Protection Agency (USEPA) regulations. For rules where an applicability determination was required, a discussion is included below.

40 CFR Part 60, Subpart A	NSPS General Provisions
40 CFR Part 60, Subpart GG	NSPS for Stationary Gas Turbines
40 CFR Part 61, Subpart M	Asbestos
40 CFR Part 64	Compliance Assurance Monitoring

VII.A. New Source Performance Standards (NSPS)

VII.A.1 Gas Turbines

The applicability of the New Source Performance Standard for Stationary Gas Turbines (40 CFR Part 60, Subpart GG) was reviewed, and it was determined that this regulation applies to the gas turbine at this facility. NSPS Subpart GG applies to stationary gas turbines that commence construction, modification, or reconstruction after October 3, 1977. The combustion turbines at the GPA Dededo facility were constructed in 1992, so this NSPS applies. As a result, these requirements have been incorporated into the Title V permit for this facility.

VII.A.2 Tanks

The applicability of the New Source Performance Standard for Volatile Organic Liquid Storage Vessels (40 CFR Part 60, Subpart Kb) was reviewed, and it was determined that this regulation does not apply to the tanks at this facility. NSPS Subpart Kb generally applies to liquid storage tanks with a capacity greater than or equal to 75 cubic meters (m^3) (19,815 gallons) that store volatile organic liquids, and for which construction, reconstruction, or modification was started after July 23, 1984. Four tanks at this facility (Units FODT-1, FODT-2, and two unnumbered 40,000 gallon storage tanks) meet the size requirement. Units FODT-1 and FODT-2 were constructed in 1994 and the applicant did not provide construction dates for the 40,000-gallon storage tanks. However, 40 CFR 110b(b) states that tanks are exempt from the NSPS if they satisfy either of the following criteria:

1. They have a capacity greater than or equal to 151 m^3 and store a liquid with a maximum true vapor pressure less than 3.5 kilopascals (kPa); or
2. They have a capacity greater than or equal to 75 m^3 but less than 151 m^3 and store a liquid with a maximum true vapor pressure less than 15.0 kPa.

The facility only stores diesel fuel in these tanks. Diesel fuel is listed in USEPA AP-42 Table 7.1-2 as having a true vapor pressure of 0.0031 pounds per square inch (psi) at 40 degrees Fahrenheit (deg F) and 0.022 psi at 100 deg F. Converting units, this translates to a true vapor pressure range from 0.021 kPa to 0.15 kPa. These values are well below the thresholds in the criteria listed above, so Units FODT-1, FODT-2, and the two unnumbered 40,000-gallon storage tanks are not subject to NSPS Subpart Kb.

VII.B. Compliance Assurance Monitoring (CAM)

Compliance Assurance Monitoring (CAM) is intended to provide a reasonable assurance of compliance with applicable requirements for large emission units that rely on pollution control device equipment to achieve compliance. The CAM regulations can be found in 40

CFR Part 64. CAM applicability is determined on a pollutant-specific basis. According to these regulations, an emission unit that meets all of the following criteria is subject to CAM:

1. The unit is located at major source required to obtain Part 70 or 71 permit;
2. The unit is subject to an emission limitation for the applicable pollutant;
3. The unit uses a control device (as defined by 40 CFR 64.1) to achieve compliance;
4. The potential precontrolled emissions of an applicable pollutant from the unit are equal to or greater than the major source threshold for that pollutant; and
5. The unit is not otherwise exempted by the CAM regulations.

Regarding the first requirement, the CAM rule (in 40 CFR 64.1) states that "*Part 70 or 71 permit* shall have the same meaning as provided under [40 CFR 70 or 71] provided that it shall also refer to a permit issued, renewed, amended, revised, or modified under any federal permit program promulgated under Title V [of the Clean Air] Act."

After receiving a special exemption from USEPA, GEPA has adopted an "alternate operating permit program" according to the requirements of 40 CFR 69.13. As a result, so it was not immediately clear whether this program satisfied the definition in the CAM rule. USEPA Region 9 was consulted on this matter, and made a determination that GEPA's alternate operating permit program was promulgated under Title V of the Clean Air Act, so facilities located on Guam are potentially subject to CAM.

The combustion turbines (Units CT-1 and CT-2) and the diesel engine generators (Units DEG-1, DEG-2, DEG-3, and DEG-4) are the only significant sources of emissions at this facility. Emissions from the diesel engine generators are not controlled with a control device (NO_x emissions are controlled using injection timing retardation). The combustion turbines employ water injection for the control of NO_x emissions, but do not employ controls for any other pollutants. Therefore, only NO_x emissions from the combustion turbines were further evaluated for CAM applicability.

VII.B.1 CAM Applicability: Units CT-1 and CT-2 NO_x Emissions

Requirement	Requirement Satisfied?	Discussion
Unit located at a major source required to obtain Part 70 or 71 permit	Yes	USEPA has determined that the GEPA permit program satisfies this requirement (see above discussion)
Unit subject to emission limitation	Yes	NO_x limits from GEPA permit, USEPA PSD permit, and Gas Turbine NSPS
Unit uses a control device (as defined by 40 CFR 64.1) to achieve compliance	Yes	Water injection is listed as a "control device" in 40 CFR 64.1
Potential precontrolled emissions of an applicable pollutant from the unit are equal to or greater than the major source threshold for that pollutant	Yes	Potential controlled emissions for each combustion turbine are 363.54 tpy, which is above major source threshold of 100 tpy. So, potential precontrolled emissions must also be above 100 tpy.
Unit is not otherwise exempted by the CAM regulations	Yes	Unit does not qualify for any exemptions from 40 CFR 64.2(b)

Conclusion: Units CT-1 and CT-2 are subject to CAM for NO_x emissions control using water injection. The details of the CAM plan prepared for this facility are listed below.

VII.B.2 CAM Plan: Units CT-1 and CT-2 NO_x Emissions

Part 1: Background

Permits and Regulations:	GEPA Permit GPA-689 (issued 10/27/97) USEPA PSD Permit GU 92-01 (issued 4/16/93) 40 CFR Part 60, Subpart GG
Emission Limits:	NO_x: 83.0 lb/hr per turbine at full-load (GEPA and USEPA permits) NO_x: 49.0 lb/hr per turbine at 50% load (USEPA permit) NO_x: 59 ppmdv at 15% O_2 (GEPA permit, NSPS)
Monitoring Requirements:	Annual stack testing of NO_x emissions
Control Technology	Water injection system

Part 2: Monitoring Approach

A. Indicator
The water-to-fuel ratio of the water injection system will be used as an indicator.

B. Measurement Approach
The water-to-fuel ratio of the water injection system is required to be monitored on a continuous basis. This ratio is required to be maintained at a level determined by testing to achieve the maximum NO_x control efficiency. The required water-to-fuel ratio is currently 0.53. This ratio will be updated with the results of the performance testing as required by the Compliance Schedule added to this permit.

C. Indicator Range
An excursion is defined to be a period when the water-to-fuel ratio falls below the required level for more than one hour. The continuous water-to-fuel ratio monitoring system is required to be accurate to within ±5%.

D. Quality Improvement Program (QIP) Threshold
The QIP threshold is 10 excursions in a six-month reporting period.

E. Performance Criteria

Data Representativeness:	Measurements are made on a continuous basis, and correlated to NO_x control efficiency for various operating loads using stack test data.
Verification of Operational Status:	Not applicable
QA/QC Practices and Criteria:	The accuracy of the continuous water-to-fuel monitoring system will be verified annually. This system is required to be accurate to within ±5%.
Monitoring Frequency	Monitoring will be performed continuously, whenever the unit is in operation.
Data Collection Procedures:	Data recorded continuously on a chart recorder, and maintained on-site.

Part 3: Justification

The injection of water into the combustor lowers the flame temperature and thereby reduces NO_x formation. Water-to-fuel ratio is used as a performance indicator. This source is required to continuously monitor the water-to-fuel ratio used by the water injection system to control NO_x emissions. This ratio is correlated to NO_x control efficiency using stack test data, and represents the best indicator of NO_x emissions control achieved by the facility.

VIII. Periodic Monitoring

Requirement	Requirement Condition Number	Existing Monitoring/ Recordkeeping	Monitoring/ Recordkeeping Added to Permit	Monitoring/ Recordkeeping Condition Number
PM emission limits for combustion turbines	II.B.1.a and II.B.1.b	Annual source testing	Weekly opacity monitoring	II.D.4 and II.D.19
Opacity limit for combustion turbines	II.B.1.b	Annual source testing	Weekly opacity monitoring	II.D.19
CO limits for combustion turbines	II.B.1.b	Annual source testing	N/A	II.D.4
NO_x limits for combustion turbines	II.B.1.b	Annual source testing	Compute NO_x emission rate for each run	II.D.4 and II.D.9
VOC limits for combustion turbines	II.B.1.b	Annual source testing	N/A	II.D.4
SO_2 limit for combustion turbines	II.B.1.b	Annual source testing	N/A	II.D.4
PM limits for diesel engine generators	II.B.2.a, II.B.2.b, and II.B.2.c	Annual source testing	Weekly opacity monitoring	II.D.4 and II.D.19
SO_2 limit for diesel engine generators	II.B.2.b	Annual source testing	N/A	II.D.4
NO_x limit for diesel engine generators	II.B.2.b	Annual source testing	N/A	II.D.4
Opacity limit for diesel engine generators	II.B.2.c	Annual source testing	Weekly opacity monitoring	II.D.4 and II.D.19
PM limit for black start diesel generator	II.B.3.a	None	Periodic opacity monitoring	II.D.20
Opacity limit for black start diesel generator	II.B.3.b	None	Periodic opacity monitoring	II.D.20

Requirement	Requirement Condition Number	Existing Monitoring/ Recordkeeping	Monitoring/ Recordkeeping Added to Permit	Monitoring/ Recordkeeping Condition Number
Preventative maintenance	II.C.1	None	Inspection and maintenance recordkeeping	II.E.2
Adequate control measures preventing air quality exceedences	II.C.2	None	N/A	N/A
Operating load limits of combustion turbines	II.C.3	None	Records of operating parameters	II.E.4
Water injection for NO_x control on combustion turbines	II.C.4	Continuous monitoring system	N/A	II.D.11
Only No. 2 fuel oil used in combustion turbines	II.C.5	Sulfur content of No. 2 fuel oil monitoring	Fuel delivery and sulfur content recordkeeping	II.D.15
Use non-resetting fuel meter	II.C.6	None	Fuel use recordkeeping	II.E.3 and II.E.6
Use water meter	II.C.6	Records of the amount of water injected		II.E.7
Fuel sulfur content limit	II.C.7	Fuel sulfur content monitoring	Fuel delivery and sulfur content recordkeeping	II.D.15 and II.E.3
Combustion turbines and water injection system good operating practices	II.C.8	None	Records of operating parameters	II.E.4

Requirement	Requirement Condition Number	Existing Monitoring/ Recordkeeping	Monitoring/ Recordkeeping Added to Permit	Monitoring/ Recordkeeping Condition Number
Limitations on black start diesel generator usage	II.C.9, II.C.10, and II.C.11	None	Records of operating parameters	II.E.4
Excess emissions for NO_x and SO_2	II.C.12	Quarterly excess emission reports	N/A	II.F.6, II.F.7, II.F.8, and II.F.9
Fugitive dust restrictions	II.C.13 and II.C.14	None	Weekly opacity monitoring	II.D.19 and II.D.20

IX. Streamlining Applicable Requirements:

Consistent with USEPA policy, overlapping or redundant requirements may be streamlined when these are incorporated in a Title V permit. In this process, the most stringent of the overlapping requirements is determined and included in the Title V permit (while the source of authority for this condition lists all related requirements, including those that have been streamlined). Streamlining allows the permit conditions to be listed in a clear and concise manner while ensuring compliance with all applicable requirements. The following section contains a description of streamlining that has been performed in this permit.

Condition II.B.1.b

The existing GEPA permit GPA-689 includes a PM_{10} emission limit for the combustion turbines (Units CT-1 and CT-2) of 20.0 lb/hr. The PM_{10} emission limit for these units in USEPA PSD permit GU 92-01 is 19.8 lb/hr. Since the USEPA PSD permit is more stringent, the 19.8 lb/hr PM_{10} emission limit was included in the permit.

The existing USEPA PSD permit GU 92-01 includes an opacity limit of 10% for the combustion turbines (Units CT-1 and CT-2). GAPCSR Section 1103.3 states that no person shall cause or permit the continuous emission of visible air pollutants with a density equal to or darker than 20% opacity from any emission unit nor the emission of visible air pollutants darker than 60% opacity for a period aggregating more than three minutes per sixty minute period. Since the USEPA PSD permit is more stringent, the 10% opacity limit was included in the permit.

Condition II.C.7 - Fuel Oil Sulfur Content Limitations

The existing GEPA permit GPA-689 and the USEPA PSD permit GU 92-01 state that the fuel oil used shall not exceed 0.6% sulfur content by weight. GAPCSR Section 1103.10 states that no person shall burn fossil fuel containing in excess of 2.0% sulfur by weight. Since the GEPA and USEPA PSD permits are more stringent, the 0.6% sulfur limit was included in the permit.