GUAM EPA
TITLE V FEDERAL OPERATING PERMIT
STATEMENT OF BASIS

Guam Power Authority
Macheche Combustion Turbine Power Generating Facility

Permit No. FO-004

Facility ID:	FO-004
Facility Name:	Guam Power Authority – Macheche
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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 Macheche facility is located on Harmon Loop Road (Route 27) in Dededo, Guam.

III. Description of Facility Operations

The facility is a combustion turbine power generating plant. The operation of this facility is to help 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 the 23 megawatt (MW) combustion turbine, a 575 kilowatt (kW) black start generator, and two 88,000 gallon diesel fuel oil storage tanks. Insignificant emission sources include two 24,000 gallon fuel oil storage tanks and a black start diesel generator service 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
CT-1	Nominal 23 MW combustion turbine	Water injection system	GPA-680
BSG-1	575 kW black start diesel generator	N/A	N/A
FOST-110	88,000 gallon diesel fuel oil storage tank	N/A	N/A
FOST-120	88,000 gallon diesel fuel oil storage tank	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.

Unit Number	Description of Activities or Emission Units
FOST-130	24,000 gallon diesel fuel oil storage tank
FOST-140	24,000 gallon diesel fuel oil storage tank
N/A	Black start diesel generator service tank

V. Potential to Emit

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

Emission	Potential to Emit (tons/year)

	NO_x	VOC	SO_2	PM_{10}	CO	Lead	HAP
CT-1	119.41	8.56	267.50	42.80	46.65	6.9×10^{-3}	0.64
BSG-1	15.70	1.27	1.04	1.11	3.38	--	1.4×10^{-2}
FOST-110	--	8.4×10^{-2}	--	--	--	--	--
FOST-120	--	8.4×10^{-2}	--	--	--	--	--
TOTAL	**135.11**	**10.00**	**268.54**	**43.91**	**50.03**	**6.9×10^{-3}**	**0.65**

VI. Guam Requirements

The following table lists the applicable requirements from the Guam Air Pollution Control Standards and Regulations (GAPCSR) and from the 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 turbine (Unit CT-1) and the black start diesel emergency generator (Unit BSG-1) 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 gas turbine at the GPA Macheche facility was constructed after this date, so this NSPS applies. As a result, these NSPS 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 FOST-110, FOST-120, FOST-130, and FOST-140) meet the size requirement and the applicant did not provide construction dates for these 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 stores only diesel fuel, which 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 FOST-110, FOST-120, FOST-130, and FOST-140 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 turbine (Unit CT-1) is the only significant source of emissions at the facility. Unit CT-1 employs water injection for the control of NO_x emissions, but it does not employ controls for any other pollutants. Therefore, only NO_x emissions were further evaluated for CAM applicability.

VII.B.1 CAM Applicability: Unit CT-1 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 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 are 119.41 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: Unit CT-1 is 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: Unit CT-1 NO_x Emissions

Part 1: Background

Permits and Regulations:	GEPA Permit GPA-680 (issued 9/10/97) 40 CFR Part 60, Subpart GG
Emission Limits:	NO_x: 55.8 lb/hr (GEPA 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 water-to-fuel is required to be at least 0.73 at 30% load and at least 0.82 at 100% load. The minimum water-to-fuel ratio for loads between 30% and 100% is required to be adjusted accordingly, but in no case may the water-to-fuel ratio be less than 0.73.

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 #	Existing Monitoring/ Recordkeeping	Monitoring/ Recordkeeping Added to Permit	Monitoring/ Recordkeeping Condition #
PM emission limit for fuel burning equipment	II.B.1.a	Annual source test for combustion turbine	Weekly opacity monitoring	II.D.4, II.D.19, and II.D.20
Opacity limit for fuel burning equipment	II.B.1.b	None	Weekly, opacity monitoring	II.D.19 and II.D.20
SO_2 emission limit for combustion turbine	II.B.2.a	Annual source test	N/A	II.D.4
NO_x emission limits for combustion turbine	II.B.2.a and II.B.2.b	Annual source test	N/A	II.D.4

Requirement	Requirement Condition #	Existing Monitoring/ Recordkeeping	Monitoring/ Recordkeeping Added to Permit	Monitoring/ Recordkeeping Condition #
PM_{10} emission limit for combustion turbine	II.B.2.a	Annual source test	N/A	II.D.4
CO emission limit for combustion turbine	II.B.2.a	Annual source test	N/A	II.D.4
UHC emission limit for combustion turbine	II.B.2.a	None	Annual source test	II.F.1
Preventative maintenance	II.C.1	None	Inspection and maintenance recordkeeping	II.E.4
Adequate control measures preventing air quality exceedences	II.C.2	None	N/A	N/A
Water injection for combustion turbine NO_x control	II.C.3	Continuous monitoring system	Fuel consumption recordkeeping	II.D.11 and II.E.2
Fuel use limitation for combustion turbine	II.C.4	Record the fuel consumption and prepare monthly summary report	N/A	II.E.2 and II.F.4
Fuel sulfur content limit for combustion turbine	II.C.5	Fuel sulfur content monitoring	N/A	II.D.15
Fuel sulfur content limit for black start generator	II.C.6	None	Fuel sulfur content recordkeeping	II.E.3

Requirement	Requirement Condition #	Existing Monitoring/ Recordkeeping	Monitoring/ Recordkeeping Added to Permit	Monitoring/ Recordkeeping Condition #
Maintenance of combustion turbine and water injection system	II.C.7	None	Inspection and maintenance recordkeeping	II.E.4
Preventive maintenance procedures for combustion turbine	II.C.9	None	Inspection and maintenance recordkeeping	II.E.4
Fugitive dust restrictions	II.C.10 and II.C.11	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.2 – NO_x Emission Limit for Combustion Turbine

The existing GEPA permit for CT-1 includes a NO_x emission limit of 59 ppm. The NSPS for Stationary Gas Turbines (40 CFR Part 60, Subpart GG) includes a NO_x emission limit of 75 ppm (with allowance to go higher for fuel NO_x or operating load). Since the limit in the GEPA permit is more stringent, the 59 ppm NO_x emission limit was included in the permit.

Condition II.C.5 – Fuel Oil Sulfur Content Limitation for Combustion Turbine

The existing GEPA permit for CT-1 states that the maximum sulfur content by weight of the No. 2 fuel oil used in this unit shall not exceed 0.5% sulfur. GAPCSR Section 1103.10 states that no person shall burn fossil fuel containing in excess of

2.0% sulfur 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 limit in the GEPA permit is the most stringent, the 0.5% sulfur limit was included in the permit.

Condition II.E.2 – Recordkeeping

The existing GEPA Permit for CT-1 has a records retention requirement of two years while the GAPCSR Section 1104.12(7)(H) requires records to be retained for at least five years. Since the GAPCSR standard is more stringent, the five year retention requirement was included in the permit.