

US EPA ARCHIVE DOCUMENT

**PREVENTION OF SIGNIFICANT DETERIORATION PERMIT  
FOR GREENHOUSE GAS EMISSIONS  
ISSUED PURSUANT TO THE REQUIREMENTS AT 40 CFR § 52.21**

**U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 6**

**PSD PERMIT NUMBER:** PSD-TX-107055-GHG

**PERMITTEE:** Apex Matagorda Energy Center, LLC

**FACILITY NAME:** Apex Matagorda Energy Center

**FACILITY LOCATION:** County Road 417, approximately 0.3 miles south  
of the intersection of County Road 417 and  
FM1468 Clemville, Matagorda County, Texas  
77414

Pursuant to the provisions of the Clean Air Act (CAA), Subchapter I, Part C (42 U.S.C. Section 7470, *et seq.*), and the Code of Federal Regulations (CFR) Title 40, Section 52.21, and the Federal Implementation Plan at 40 CFR § 52.2305 (effective May 1, 2011 and published at 76 FR 25178), the U.S. Environmental Protection Agency (EPA), Region 6 is issuing a Prevention of Significant Deterioration (PSD) permit to Apex Matagorda Energy Center, LLC (Apex Matagorda) for Greenhouse Gas (GHG) emissions. The Permit applies to the construction of new compressed air energy storage (CAES) facility to be located near Clemville, Matagorda County, Texas.

Apex Matagorda is authorized to construct a new CAES bulk energy storage system using CAES technology as described herein, in accordance with the permit application (and plans submitted with the permit application), the federal PSD regulations at 40 CFR § 52.21, and other terms and conditions set forth in this PSD permit in conjunction with the corresponding Texas Commission on Environmental Quality (TCEQ) standard permit No. 107055. Failure to comply with any condition or term set forth in this PSD permit may result in enforcement action pursuant to Section 113 of the Clean Air Act (CAA). This PSD permit does not relieve Apex Matagorda of the responsibility to comply with any other applicable provisions of the CAA (including applicable implementing regulations in 40 CFR Parts 51, 52, 60, 61, 72 through 75, and 98) or other federal and state requirements (including the state PSD program that remains under approval at 40 CFR § 52.2303).

In accordance with 40 CFR § 124.15(b), this PSD permit becomes effective 30 days after the service of notice of this final decision unless review is requested on the permit pursuant to 40 CFR § 124.19.

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Wren Stenger, Director  
Multimedia Planning and Permitting Division

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Date

**Apex Matagorda Energy Center, LLC (PSD-TX-107055-GHG)**  
**Prevention of Significant Deterioration Permit**  
**For Greenhouse Gas Emissions**  
**Draft Permit Conditions**

**PROJECT DESCRIPTION**

Apex Matagorda will construct the Matagorda Energy Center consisting of new compressed air energy storage (CAES) power plant in Matagorda County, Texas to produce up to 317 MW of electrical power. The Matagorda facility will employ two Dresser-Rand CAES compression trains, each consisting of a multi-stage compressor section driven by a dedicated 150 MW (nominal rating) electric motor. Each compression train will be capable of producing up to 1.4 million pounds per hour of air at a compressor outlet pressure of up to 2,830 psia and will be operated during non-peak hours. The air will be stored in underground caverns. The cavern well casing shoe for Apex Matagorda will be set at a depth of approximately 3750 feet and will have a maximum pressure of 3188 psia. The energy from the stored compressed high pressure air will be supplemented with the natural gas fired combustion turbines to produce electricity. The expansion/generation component of the plant will consist of two expansion turbine/generator trains, each rated at 158.34 MW to supply peak energy for the Electric Reliability Council of Texas (ERCOT) system. At maximum compression load, the facility will consume up to 300 MW of energy, while at maximum generator output the facility will produce approximately 317 MW of electricity. If full, the cavern will support approximately 100 hours of generation at full rated output without recharge.

**EQUIPMENT LIST**

The following devices are subject to this GHG PSD permit:

<b>FIN</b>	<b>EPN</b>	<b>Description</b>
TURBTRNA TURBTRNB	TURBASTK TURBBSTK	Two Natural Gas-Fired Gas Expansion Turbine Train (Combustion Units) Electrical generators driven by the gas expansion turbines have a peak gross production rate of 158.34 MW for each train.
GENENG1	GENENG1	One Emergency Generator (Combustion Unit). 740 kW Natural Gas Fired Emergency Generator limited to 50 hours of operation per year for non-emergency activities.
MAINT1	MAINT1	Natural Gas Maintenance Purges
FUG1	FUG1	Natural Gas Fugitives and SF <sub>6</sub> Insulated Electrical Equipment (i.e., six circuit breakers with 365 lb SF <sub>6</sub> each) for a 2,190 lb SF <sub>6</sub> total capacity

## **I. GENERAL PERMIT CONDITIONS**

### **A. PERMIT EXPIRATION**

As provided in 40 CFR §52.21(r), this PSD permit shall become invalid if construction:

- a. is not commenced (as defined in 40 CFR § 52.21(b)(9)) within 18 months after the approval takes effect; or
- b. is discontinued for a period of 18 months or more; or
- c. is not completed within a reasonable time.

Pursuant to 40 CFR § 52.21(r), EPA may extend the 18-month period upon a written satisfactory showing that an extension is justified.

### **B. PERMIT NOTIFICATION REQUIREMENTS**

Permittee shall notify EPA Region 6 in writing or by electronic mail of the:

1. date construction is commenced, postmarked within 30 days of such date;
2. actual date of initial startup, as defined in 40 CFR § 60.2, postmarked within 15 days of such date; and
3. date upon which initial performance tests will commence, in accordance with the provisions of Section V, postmarked not less than 30 days prior to such date. Notification may be provided with the submittal of the performance test protocol required pursuant to Condition V.A.

### **C. FACILITY OPERATION**

At all times, including periods of startup, shutdown, and maintenance, Permittee shall, to the extent practicable, maintain and operate the facility including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to EPA, which may include, but is not limited to, monitoring results, review of operating maintenance procedures and inspection of the facility.

#### **D. MALFUNCTION REPORTING**

1. Permittee shall notify EPA by mail within 48 hours following the discovery of any failure of air pollution control equipment, process equipment, or a process to operate in a normal manner, which results in an increase in GHG emissions above the allowable emission limits stated in Sections II and III of this permit.
2. Within 10 days of the restoration of normal operations after any failure described in I.D.1., Permittee shall provide a written supplement to the initial notification that includes a description of the malfunctioning equipment or abnormal operation, the date of the initial malfunction, the period of time over which emissions were increased due to the failure, the cause of the failure, the estimated resultant emissions in excess of those allowed in Section II and III, and the methods utilized to mitigate emissions and restore normal operations.
3. Compliance with this malfunction notification provision shall not excuse or otherwise constitute a defense to any violation of this permit or any law or regulation such malfunction may cause.

#### **E. RIGHT OF ENTRY**

EPA authorized representatives, upon the presentation of credentials, shall be permitted:

1. to enter the premises where the facility is located or where any records are required to be kept under the terms and conditions of this PSD permit;
2. during normal business hours, to have access to and to copy any records required to be kept under the terms and conditions of this PSD permit;
3. to inspect any equipment, operation, or method subject to requirements in this PSD permit; and
4. to sample materials and emissions from the source(s).

#### **F. TRANSFER OF OWNERSHIP**

In the event of any changes in control or ownership of the facilities to be constructed, this PSD permit shall be binding on all subsequent owners and operators. Permittee shall notify the succeeding owner and operator of the existence of the PSD permit and its conditions by letter. A copy of the letter shall be forwarded to EPA Region 6 within 30 days of the letter signature.

#### **G. SEVERABILITY**

The provisions of this PSD permit are severable, and, if any provision of the PSD permit is held invalid, the remainder of this PSD permit shall not be affected.

**H. ADHERENCE TO APPLICATION AND COMPLIANCE WITH OTHER ENVIRONMENTAL LAWS**

Permittee shall construct this project in compliance with this PSD permit, the application on which this permit is based, the TCEQ Standard Permit Registration Number 107055 and all other applicable federal, state, and local air quality regulations. This PSD permit does not release Permittee from any liability for compliance with other applicable federal, state, and local environmental laws and regulations, including the Clean Air Act.



## I. ACRONYMS AND ABBREVIATIONS

AVO	Auditory, Visual and Olfactory
BACT	Best Available Control Technology
BSCFD	Billion Standard Cubic Feet per Day
CAA	Clean Air Act
CAES	Compressed Air Energy Storage
CC	Carbon Content
CCS	Carbon Capture and Sequestration
CEMS	Continuous Emissions Monitoring System
CFR	Code of Federal Regulations
CH <sub>4</sub>	Methane
CO <sub>2</sub>	Carbon Dioxide
CO <sub>2</sub> e	Carbon Dioxide Equivalent
dscf	Dry Standard Cubic Foot
EF	Emission Factor
EPN	Emission Point Number
FIN	Facility Identification Number
FR	Federal Register
GHG	Greenhouse Gas
gr	Grains
GWP	Global Warming Potential
HHV	High Heating Value
kWh	Kilowatt-hour
hr	Hour
LAER	Lowest Achievable Emission Rate
lb	Pound
LDAR	Leak Detection and Repair
MMBtu	Million British Thermal Units
MWh	Megawatt hour
SS	Start-up and Shutdown
mtpa	Million Tons per Annum
NNSR	Nonattainment New Source Review
N <sub>2</sub> O	Nitrous Oxides
NO <sub>x</sub>	Nitrogen Oxides
NSPS	New Source Performance Standards
PSD	Prevention of Significant Deterioration
QA/QC	Quality Assurance and/or Quality Control
SCFH	Standard Cubic Feet per Hour
SCR	Selective Catalytic Reduction
SF <sub>6</sub>	Sulfur Hexafluoride
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TPY	Tons per Year
USC	United States Code
VOC	Volatile Organic Compound

## II. Annual Emission Limits

Annual emissions, in tons per year (tpy) on a 12-month total, rolling monthly, shall not exceed the following:

**Table 1. Facility Emission Limits<sup>1</sup>**

EPN	Description	GHG Mass Basis		TPY CO <sub>2</sub> e <sup>2,3</sup>	BACT Requirements
			TPY <sup>2</sup>		
TURBASTK TURBBSTK	Combined Gas Expansion Turbine Train A and Train B	CO <sub>2</sub>	456,296	458,734	i. BACT of 558 lb CO <sub>2</sub> /MWh <sup>5</sup> on a 12-month rolling average ii. Special Condition III.A. iii. Maximum heat input to either train is 695.1MMBtu/hr. iv. Work practice standards in Section III A.
		CH <sub>4</sub>	12.66		
		N <sub>2</sub> O	7.12		
FUG1 <sup>4</sup>	Fugitives	CO <sub>2</sub>	No Numerical Limit Established	No Numerical Limit Established	Implementation of AVO program. See Special Condition III.C.
		CH <sub>4</sub>	No Numerical Limit Established		
		SF <sub>6</sub>	No Numerical Limit Established		
GENENG1	Natural Gas-Fired Emergency Generator	CO <sub>2</sub>	23	23	Good Combustion and Operating Practices. Limit to 50 hours of operation per year. See Special Condition III.C.
MAINT1 <sup>6</sup>	Maintenance	CO <sub>2</sub>	No Numerical Limit Established	No Numerical Limit Established	See Special Condition III.D. Maintenance purges of the natural gas pipeline is limited to 4/year.
		CH <sub>4</sub>	No Numerical Limit Established		
Total	Facility-wide			458,757	

- Compliance with the annual emission limits (tpy) is based on a 12-month total, rolling monthly.
- The tpy emission limits specified in this table are not to be exceeded for this facility and include emissions from the facility during all operations to include startup and shutdown activities.
- Global Warming Potentials (GWP): CH<sub>4</sub> = 25, N<sub>2</sub>O = 298, SF<sub>6</sub> = 22,800 as of January 1, 2014, 40 CFR 98 Table 1-A.
- Fugitive emissions (EPN FUG1) are estimated to be 0.27 tpy CO<sub>2</sub>, 5.56 tpy CH<sub>4</sub>, and 0.0065 tpy SF<sub>6</sub> for a total of 288 tpy CO<sub>2</sub>e. The emission limit will be a design/work practice standard as specified in this permit.
- Electrical output shall be measured at the generator terminals.
- Maintenance emissions are estimated to be 1.01 tpy CH<sub>4</sub> and 0.4 tpy CO<sub>2</sub> for a total of 25.65 tpy CO<sub>2</sub>e.



### III. SPECIAL PERMIT CONDITIONS

#### A. Gas Expansion Turbine Trains

##### 1. Emission Limits and Conditions (FINs: TURBTRNA and TURBTRNB)

**Table 2**  
**BACT Emission Limits for Gas Expansion Turbine Trains**

Gross Heat Rate (Btu/kWh) (HHV)	Output Based Emission Limit (lb CO <sub>2</sub> /MWh) 12-month rolling average
4,499 – 50% load	558 – at any operating load
4,390 – 100% load	

- a. The gas expansion turbines shall meet a BACT limit of 558 lbs CO<sub>2</sub>/MWh on a 12-month rolling average basis. To determine compliance with the BACT emission limit, Permittee shall utilize the measured hourly energy output (MWh) at the generator terminals and the tons of CO<sub>2</sub> emissions recorded by the CEMS to calculate the hourly rate, which is averaged monthly.
- b. Only pipeline quality natural gas is to be used in the combustion turbines with a fuel sulfur content of up to 5 grains of sulfur per 100 dry standard cubic feet.
- c. Within 60 days after achieving the maximum production rate at which the affected facility will be operated, but not later than 180 days of the date of initial startup of the gas expansion turbine trains, Permittee shall perform an initial performance test for CO<sub>2</sub> and use emission factors from 40 CFR Part 98 to determine compliance with the BACT emission limit in Table 1. Permittee shall calculate the emissions based on the measured hourly energy output (MWh), when the gas expansion turbine is operating at or above 90% of its design capacity and the results shall be corrected to ISO conditions (59°F, 14.7 psia, and 67% humidity). If the turbines do not meet the design emissions limit, then Permittee shall remedy the turbines' failure to meet the design emissions limit, will make corrections to the turbines, and will only combust fuel to perform required tuning and modifications necessary to demonstrate compliance.
- d. Upon demonstration that the gas expansion turbines are in compliance with the design emissions limit via an emission test, Permittee shall not discharge or cause the discharge of emissions from TURBTRNA and TURBTRNB into the atmosphere in excess of the limits in lb CO<sub>2</sub>/MWh (gross) on a 12-month rolling average and shall not discharge or cause the discharge of emissions into the atmosphere in excess of the limits in tons of CO<sub>2</sub>e on a 12-month rolling average as listed in Table 1.
- e. The energy efficiency factor of the turbines is 4773 MMBTU/kWh (electrical output at the generator terminal) on a 12-month rolling average. To determine compliance with this limit, Permittee shall calculate the hourly heat input rate utilizing equation F-20 and procedures provided in 40 CFR § 75.10(b)-(f) and Appendix F, at 5.5.2 and the measured hourly energy

output (kWh). Sum the hourly heat input for the operating month and sum the hourly energy output for the operating month. Divide the total heat input for the month by the total energy output for the month. Add the quotient to the sum of the quotients of the previous 11 months and divide by the number of operating months in the last 12 months to determine the 12-month rolling average.

- f. Permittee shall determine the hourly CO<sub>2</sub> emission rate by installing and operating a volumetric stack gas flow monitor and associated data acquisition and handling system in accordance with the CO<sub>2</sub> CEMS system provided in 40 CFR § 75.10(a)(3) and (a)(5).
- g. Maximum heat duty to each turbine train shall not exceed 695.1 MMBtu/hr.
- h. Each turbine shall be installed with a recuperator to preheat the air entering the expander train.

## **2. Monitoring of CO<sub>2</sub> Emissions**

- a. Permittee shall install a CO<sub>2</sub> CEMS and volumetric stack gas flow monitoring system with an automated data acquisition and handling system for measuring and recording CO<sub>2</sub> emissions discharged to the atmosphere.
- b. In accordance with 40 CFR Part 75, Appendix D and 40 CFR Part 60, Permittee shall ensure that all required fuel flow meters are installed, a periodic schedule for GCV fuel sampling is initiated, and all certification tests are completed on or before the earlier of 90 unit operating days or 180 calendar days after the date the unit commences commercial operation (as defined in 40 CFR Part 75, Appendices D and G).
- c. Permittee shall ensure compliance with the specifications and test procedures for the fuel flow meter and/or the CO<sub>2</sub> emission monitoring system at stationary sources, in accordance with 40 CFR Parts 60 and 75.
- d. Permittee shall meet the appropriate quality assurance requirements specified in 40 CFR Part 75, Appendices D and F and 40 CFR Part 60 for the fuel flow meter and/or the CO<sub>2</sub> emission monitoring system.

## **3. Work Practice and Operational Requirements**

- a. All fuel combustion units identified in this permit shall have fuel metering, and Permittee shall:
  - i. Measure and record the fuel flow rate using an operational non-resettable elapsed flow meter or by recording the flow rate data in an electronic format with individual flow measurements being taken no less frequently than once every 15 minutes. Electronic data may be reduced to hourly averages for recordkeeping purposes.
  - ii. Record the total fuel combusted monthly.
  - iii. The fuel gross calorific value (GCV) [high heat value (HHV)] of the fuel shall be determined, at a minimum, semiannually by the procedures contained in 40 CFR § 98.34(a)(6), and records shall be maintained of the semiannual fuel GCV for a period of five years. Upon request, Permittee shall provide a sample and/or analysis

of the fuel that is fired in the heaters or shall allow a sample to be taken by EPA for analysis.

- iv. The fuel flow of the fuel fired in the gas expansion turbines shall be continuously monitored and recorded.
- b. Permittee shall calibrate and perform a preventative maintenance check of the fuel gas flow meters annually. Permittee shall document the results.
- c. Permittee shall install and operate pressure and vibration monitoring equipment on the combustion turbine packages.
- d. Each gas expansion turbine train shall be equipped with a recuperator. The recuperator shall be continuously monitored for efficiency. Pressure and temperature measurements of the air at the recuperator inlet, outlet, and of the gas expansion turbine exhaust will be monitored and compared to expected values based on the gas expansion trains' air mass flow and gas fuel input.
- e. Maintenance on the turbines will be conducted per manufacturer's recommendation and included in Appendix of the permit.

#### **4. Gas Expansion Turbines Startup and Shutdown**

- a. Permittee shall minimize emissions during start-up and shutdown activities by operating and maintaining the facility and associated air pollution control equipment in accordance with good air pollution control practices, safe operating practices, and protection of the facility.
- b. Emissions during startup and shutdown activities shall be minimized by limiting the duration of operation in startup and shutdown mode as follows:
  - i. A planned startup for each turbine is limited to 30 minutes per event.
  - ii. A planned shutdown of the turbine is limited to 3 minutes per event.
  - iii. Shutdowns shall not exceed 365 events per year per turbine train.
- c. Permittee must record the time, date, fuel heat input (HHV) in MMBtu/hr, and duration of each startup and shutdown event in order to calculate total CO<sub>2</sub>e emissions. The records must include hourly CO<sub>2</sub> emission levels as measured by the fuel flow meter and/or O<sub>2</sub> emission monitor (or CO<sub>2</sub> CEMS with volumetric stack gas flow rate) and the calculations based on the actual heat input for the CO<sub>2</sub>, CO<sub>2</sub>e, O<sub>2</sub>, N<sub>2</sub>O, and CH<sub>4</sub> emissions during each startup and shutdown event based on the equations represented in the permit application. These records must be kept for five years following the date of such event.

#### **B. Emergency Generator (EPN: GENENG1)**

1. The Emergency Generator (GENENG1) shall combust pipeline quality natural gas.
2. The Emergency Generator is limited to 50 hours of non-emergency operation per year. Compliance with the 50-hour non-emergency operational requirement is determined on a 12-month rolling basis.
3. The Emergency Generator shall meet the applicable monitoring and recordkeeping requirements as required in 40 CFR Part 60 Subpart JJJJ, Standards of Performance for Stationary Spark

Ignition Internal Combustion Engines.

4. Permittee shall install and maintain an operational non-resettable elapsed time meter for the Emergency Generator.
5. Permittee shall maintain a file of all records, data measurements, reports and documents related to the operation of the Emergency Generator, including, but not limited to, the following: all records or reports pertaining to maintenance performed, all records relating to performance tests and monitoring of the emergency generator equipment, fuel heat input values, hours of operation required in Special Condition III.B., and all other information required by 40 CFR 60 Subpart JJJJ or this permit. All information shall be recorded in a permanent form suitable for inspection.

**C. Plant Wide Natural Gas Fugitive Emission Sources (EPN: FUG1)**

1. Permittee shall implement an auditory, visual, and olfactory (AVO) method for detecting leaks in natural gas piping components and fugitive emission of methane from natural gas piping components.
2. AVO monitoring shall be performed daily.
3. Tag the leaks for repairs to be done within 5 days or replaced within 15 days when possible.
4. For circuit breakers, SF<sub>6</sub> emissions shall be calculated annually (calendar year) in accordance with the mass balance approach provided in equation DD-1 of the Mandatory Greenhouse Gas Reporting rules for Electrical Transmission and Distribution Equipment Use, 40 CFR Part 98, Subpart DD. Permittee shall not exceed the insulated circuit breaker SF<sub>6</sub> capacity of 365 lbs per circuit breaker.
5. Permittee shall equip the circuit breakers with a low pressure alarm and a low pressure lockout.
6. Permittee shall maintain a file of all records, data measurements, reports, and documents related to the fugitive emission sources including, but not limited to, all records or reports pertaining to maintenance performed and all records relating to compliance with the Monitoring and Quality Assurance and Quality Control (QA/QC) procedures outlined in 40 CFR § 98.304.

**D. Natural Gas Maintenance Purges (EPN: MAINT1)**

1. Permittee shall limit the number of purges performed in a year to four.
2. Permittee shall keep records of each maintenance purge performed to include the date, time, duration, and estimated volume of gas released to the atmosphere.

**IV. MONITORING, REPORTING AND RECORDKEEPING REQUIREMENTS**

1. Monitor and record the CO<sub>2</sub> emissions from the CEMS to include the raw data from the recorder, the computation of the hourly emissions to determine compliance with the limit, and conditions of the turbine trains as specified in Section III.A.
2. Monitor the turbine stack temperatures to indicate recuperator performance and maintenance requirements.
3. Monitor the fuel used and the maintenance and quality assurance of the fuel meters for the turbines and the emergency generator as stated in Section III.

4. Records and data for the appropriate quality assurance requirements specified in 40 CFR Part 75, Appendices D and F and 40 CFR Part 60 for the fuel flow meter and/or CO<sub>2</sub> emission monitoring system should be maintained for five years following the date of such measurements, maintenance, reports, and/or records
5. Records of all maintenance to the turbines (work practice standards), reliability tests for the emergency generators, fugitive emission equipment, and facility maintenance purging of the natural gas lines should be kept on site.
6. Monitor and keep records of the comprehensive fugitive emission program to include the components that are leaking, repaired and have not been repaired within the 15 days.
7. Keep records of the duration and number of events of pipeline purging for maintenance.
8. For SF<sub>6</sub>, the emissions shall be calculated annually in accordance with the mass balance approach provided in 40 CFR § 98.303(a), Equation DD-1. All reports of maintenance performed and compliance with the Monitoring and Quality Assurance and Quality Control (QA/QC) procedures in 40 CFR § 98.304.
9. Keep records of the low pressure alarms and lockout occurrences and of possible releases to the atmosphere of SF<sub>6</sub> using the equation on 40 CFR §98.303(a), Equation DD-1, and the action taken to fix the problem.
10. Permittee shall calculate the CH<sub>4</sub> and N<sub>2</sub>O emissions on a 12-month total, rolling monthly. Permittee shall determine compliance with the CH<sub>4</sub> and N<sub>2</sub>O emissions limits contained in section II using the default CH<sub>4</sub> and N<sub>2</sub>O emission factors contained in Table C-2 of 40 CFR Part 98 and the measured actual hourly heat input (HHV).
11. Permittee shall calculate the CO<sub>2</sub>e emissions on a 12-month total, rolling monthly, based on the procedures and Global Warming Potentials (GWP) contained in Greenhouse Gas Regulations, 40 CFR Part 98, Subpart A, Table A-1.
12. Compliance with the emission limits and conditions stated in Section III should be summarized as a monthly report for:
  - a. Operating hours for CAES Turbine Trains A and B and Emergency Generator;
  - b. The natural gas fuel usage for all combustion sources, using continuous fuel flow monitors (a group of equipment can utilize a common fuel flow meter, as long as actual fuel usage is allocated to the individual equipment based upon actual operating hours and maximum firing rate);
  - c. The HHV of the fuel and the kWh produced by the turbines;
  - d. CO<sub>2</sub> CEMS data;
  - e. Energy efficiency of the turbines in MMBTU/kWh;
  - f. Fugitive emissions program compliance;
  - g. Calculations of SF<sub>6</sub> emissions using Equation DD-1 of 40 CFR § 98.303;
  - h. Number of startup/shutdown events;
  - i. Number and duration of maintenance purging events of natural gas lines; and
  - j. Total CO<sub>2</sub>e emissions from the facility on a monthly basis.
13. Permittee shall maintain records and submit a written report of all GHG excess emissions to EPA semi-annually, except when more frequent reporting is specifically required by an applicable subpart or the Administrator or authorized representative, on a case-by-case basis, determines that more frequent reporting is necessary to accurately assess the compliance status of the source.

Excess emissions shall be defined as any period in which the facility emissions exceed a maximum emission limit set forth in this permit. The report is due on the 30<sup>th</sup> day following the end of each semi-annual period and shall include the following:

- a. Time intervals, data and magnitude of the excess emissions, the nature and cause (if known), corrective actions taken and preventive measures adopted;
  - b. Applicable time and date of each period during which the monitoring equipment was inoperative (monitoring down-time);
  - c. A statement in the report of a negative declaration, i.e., a statement when no excess emissions occurred or when the monitoring equipment has not been inoperative, repaired or adjusted; and
  - d. Any failure to conduct any required source testing, monitoring, or other compliance activities.
14. Excess emissions indicated by GHG emission source certification testing or compliance monitoring shall be considered violations of the applicable emission limit for the purpose of this permit.
15. All records required by this PSD permit shall be retained and remain accessible for not less than 5 years following the date of such measurements, maintenance, and reporting.

#### **V. PERFORMANCE TESTING**

Within 60 days after achieving the maximum production rate at which the affected facility will be operated, but not later than 180 days after initial startup of the facility, performance tests(s) must be conducted and a written report of the performance testing results furnished to EPA. Additional sampling may be required by TCEQ or EPA.

- A. Permittee shall submit a performance test protocol to EPA no later than 30 days prior to the test to allow review of the test plan and to arrange for an EPA observer to be present at the test. The performance test shall be conducted in accordance with the submitted protocol, and any changes required by EPA.
- B. The owner or operator shall provide, or cause to be provided, performance testing facilities as follows:
  1. Sampling ports adequate for test methods applicable to this facility,
  2. Safe sampling platform(s),
  3. Safe access to sampling platform(s), and
  4. Utilities for sampling and testing equipment.
- C. Unless otherwise specified, each performance test shall consist of three separate one hour- runs using the applicable test method. Each run shall be conducted for the time and under the conditions specified in the applicable standard. For purposes of determining compliance with an applicable standard, the arithmetic mean of the results of the three runs shall apply.
- D. Permittee shall perform stack sampling and other testing to establish the actual pattern and quantities of air contaminants being emitted into the atmosphere from the stacks of the Gas Expansion Turbines to determine the initial compliance with the CO<sub>2</sub> emission limits established in this permit. Sampling shall be conducted in accordance with 40 CFR § 60.8 and EPA Method 3a or 3b for the

concentration of CO<sub>2</sub>.

1. Multiply the CO<sub>2</sub> hourly average emission rate determined under maximum operating test conditions by 8,760 hours for the gas expansion turbines.
  2. If the above calculated CO<sub>2</sub> emission total does not exceed the tpy specified on Table 1, no compliance strategy needs to be developed.
  3. If the above calculated CO<sub>2</sub> emission total exceeds the tpy specified in Table 1, the facility shall document the potential to exceed in the test report and explain within the report how the facility will assure compliance with the CO<sub>2</sub> emission limit listed in Table 1.
- E. The turbine shall be tested at or above 90% of maximum load operations and at 50% and 10% of load operations for the atmospheric conditions which exist during testing. The tested turbine load shall be identified in the sampling report. The permit holder shall present in the performance test protocol the manner in which stack sampling will be executed in order to demonstrate compliance with the emissions limits contained in the permit.
- F. Performance tests must be conducted under such conditions to ensure representative performance of the affected facility. The owner or operator must make available to EPA such records as may be necessary to determine the conditions of the performance tests.
- G. Performance tests for one turbine train can be used as being representative of an identical turbine train if approved by EPA in the performance test protocol.
- H. Emissions testing, as outlined above, shall be performed every 5 years, plus or minus six months, of when the previous performance test was performed or within 180 days after the issuance of a permit renewal, whichever comes later, to verify continued performance at permitted emission limits.

## **VI. Agency Notifications**

Permittee shall submit GHG permit applications, permit amendments, and other applicable permit information to:

Multi Media Planning and Permitting Division  
EPA Region 6  
1445 Ross Avenue (6 PD-R)  
Dallas, TX 75202  
Email: Group R6AirPermits@EPA.gov

Permittee shall submit a copy of all compliance and enforcement correspondence as required by this Approval to Construct to:

Compliance Assurance and Enforcement Division  
EPA Region 6  
1445 Ross Avenue (6EN)  
Dallas, TX 75202

Table 1. Dresser-Rand LP Turbo-Expander Maintenance Schedule

Component	Recommended Maintenance Activity	
	Hot Gas Path Inspect-Repair Interval <sup>(2)</sup>	
	Starts	EOH <sup>(3)</sup> (hours)
Combustion Liners	1000	24,000
Transition Pieces	1000	24,000
Fuel Nozzles	1000	24,000
Stage 1 Nozzles	1000	24,000
Stage 2 Nozzles	1000	24,000
Stage 3 Nozzles	1000	24,000
Stage 4 Nozzles	1000	24,000
Stage 1 Buckets	1000	24,000 <sup>(3)</sup>
Stage 2 Buckets	1000	24,000 <sup>(3)</sup>
Stage 3 Buckets	1000	24,000
Stage 4 Buckets	1000	24,000

**Notes:**

(1) Whichever comes first.

(2) Equivalent Operating Hours (EOH) Calculation:

Emergency Start (<10 Min)	50 EOH
Fast Start (=10 < 15 Min)	25 EOH
Normal Start(>15 Min)	15 EOH
1600°F TIT	EOH = 1 X actual fired hours
≤ 1550°F TIT	EOH = .75 X actual fired hours
≤ 1500°F TIT	EOH = .5 X actual fired hours

(3) Stage 1 & 2 buckets must be removed from rotor to inspect bucket and disk fir trees at 1st HGPI.  
All stages at subsequent HGPI's.



Table 2. Dresser-Rand CAES HP & VHP Turbo-Expander Maintenance Schedule

Component	Recommended Maintenance Activity	
	Gas Path Inspect-Repair Interval <sup>(1)</sup>	
	Starts	EOH <sup>(2)</sup> (hours)
Combustion Liners	1000	24,000
Fuel Nozzles	1000	24,000
Stage 1 Nozzles	1000	48,000
Stage 2 - 6 Nozzles	1000	48,000
Stage 1 Buckets	1000	48,000
Stage 2 - 6 Buckets	1000	48,000
Rotor	1000	48,000

**Notes:**

(1) Whichever comes first.

(2) Equivalent Operating Hours (EOH) Calculation:

**Starts:** 15 hours/start  
(power-generation or compressor starts using expanders)

**Operating Hours:** 1000°F TIT      EOH = 1.0 X actual fired hours  
<950°F TIT      EOH = 0.75 X actual fired hours