

STATEMENT OF BASIS

Calpine Operating Services, Inc Morgan Energy Center, LLC

Decatur, Alabama
Morgan County
712-0080

This proposed Renewal Title V Major Source Operating Permit is issued under the provisions of ADEM Admin. Code r. 335-3-16. The above-referenced applicant has applied to renew the existing Title V Permit, which was originally issued on February 21, 2005. The applicant has requested authorization to perform the work or operate the facility shown on the application and drawings, plans and other documents, which were submitted on July 22, 2020, and are attached hereto or on file with the Air Division of the Alabama Department of Environmental Management, in accordance with the terms and conditions of this permit.

Morgan Energy Center, LLC was issued its 2nd renewal Major Source Operating Permit (MSOP) on January 5, 2016 with an expiration date of January 24, 2021. Per ADEM Rule 335-3-16-.12(2), an application for permit renewal shall be submitted at least six (6) months, but not more than eighteen (18) months, before the date of expiration of the permit. Based on this rule, the application for renewal was due to the Department no later than July 24, 2020, but no earlier than July 24, 2019. An application for permit renewal was submitted to the Department on July 22, 2020. No additional information was deemed necessary for processing of this MSOP.

The Morgan Energy Center is operated by Calpine Operating Services Company, Inc. (Calpine) and is located in Decatur, Morgan County, Alabama. This facility is located within the BP Decatur Works on the Tennessee River. This facility generates approximately 700 MW of electric power for customer distribution. The significant sources of air pollutants at this facility are:

- Three 180 MW Natural Gas Fired Combined-Cycle Combustion Turbines each consisting of one combustion turbine (CT) and one heat recovery steam generator (HRSG) equipped with a 400 MMBtu/hr natural gas fired duct burner and Selective Catalytic Reduction (SCR).

Combined-Cycle Combustion Turbine Units

The combined-cycle combustion turbine units fire only pipeline quality natural gas. The combustion turbines are Siemens Westinghouse Model 501FD designs with a nominal electric generation capacity of approximately 180 MW each. The CT units are equipped with Dry Low NO_x Burners which reduce the NO_x emissions. The NO_x emissions from the combined cycle combustion turbines are controlled by the use of SCRs installed in each HRSG. The Duct Burners, manufactured by Coen, are limited to 400 MMBtu/hr per DB and also have a low NO_x burner design. The DBs are intermittently fired and each is limited to 600,000 MMBtu of natural gas per 12-consecutive months. The DBs cannot operate unless the CT is in operation. Each CT is capable of being operated in a mode

referred to as power augmentation. In this mode, steam is injected into the CT and increases the mass flow through the turbine. This increase in mass flow increases the electric generating capacity from the CT. The HRSGs supply steam to on steam turbine and to BP. The steam turbine is capable of producing an additional 160 MW of electricity.

The combined-cycle combustion turbine units were subject to a Prevention of Significant Deterioration (PSD) Review in which BACT was established for NO_x, CO, VOC, and PM. The combined-cycle combustion turbines are also subject to the Federal New Source Performance Standards (NSPS) contained in 40 CFR Part 60, Subpart GG, and the duct burners are subject to NSPS, Subpart Da.

The estimated emissions and the associated standards for the combined-cycle combustion turbines are listed below.

Emission Standards

Opacity:

- Except during startup, shutdown, and load change, visible emissions from this unit shall not exceed 10% opacity.

(ADEM Admin. Code r. 335-3-14-.04) BACT

Particulate Matter (PM):

- The combined PM emissions from the combustion turbine and duct burner shall not exceed 0.005 lb/MMBtu and 11.0 lbs/hr.

(ADEM Admin. Code r. 335-3-14-.04) BACT

- The PM emissions from the duct burner shall not exceed 0.03 lb/MMBtu

(40 CFR 60.42Da)

The PM emission standards apply at all time except during startup, shutdown, and load change.

Sulfur Dioxide (SO₂):

- The SO₂ emissions from the combustion turbine shall not exceed 150 ppmvd (at 15% O₂) or a fuel sulfur limit of 0.8% by weight.

(40 CFR 60.333)

- The SO₂ emissions from the duct burner shall not exceed 0.20 lb/MMBtu.

(40 CFR 60.43Da)

Nitrogen Oxides (NO_x):

- The combined NO_x emissions from the combustion turbine and duct burner shall not exceed 0.013 lb/MMBtu and 31.2 lb/hr.

(ADEM Admin. Code r. 335-3-14-.04) BACT

- The NO_x emissions from the combustion turbine shall not exceed 112 ppmvd at 15% O₂.

(40 CFR 60.332)

- The NO_x emissions from the duct burner shall not exceed 1.6 lb/MW_{hr}.

(40 CFR 60.44Da)

The NO_x emission standards apply at all time except during startup, shutdown, and load change.

Carbon Monoxide (CO):

- The combined CO emissions from the combustion turbine and duct burner during Power Augmentation shall not exceed 0.1 lb/MMBtu and 232.0 lb/hr.

(ADEM Admin. Code r. 335-3-14-.04) BACT

- The CO emissions while firing the combustion turbine only shall not exceed 0.117 lb/MMBtu and 156.0 lb/hr.

(ADEM Admin. Code r. 335-3-14-.04) BACT

The CO emission standards apply at all time except during startup, shutdown, and load change.

Volatile Organic Compounds (VOC):

- The combined VOC emissions from the combustion turbine and duct burner shall not exceed 0.0131 lb/MMBtu and 30.0 lb/hr.

(ADEM Admin. Code r. 335-3-14-.04) BACT

The VOC emission standards apply at all time except during startup, shutdown, and load change.

Expected Emissions

Particulate Matter (PM) & Opacity:

- During initial compliance testing, the PM emission rate was

approximately 0.004 lb/MMBtu while firing the duct burners, which is the operating mode that should yield the highest PM emission rate. No visible emissions are expected from the unit while firing natural gas.

Sulfur Dioxide (SO₂):

- Natural gas is the exclusive fuel for this unit. According to 40 CFR Part 75 Table LM-1, expected emissions from pipeline natural gas would be approximately 0.0006 lb/MMBtu.

Nitrogen Oxides (NO_x):

- During the most recent compliance test (June 2015), the NO_x emission rates from the units were less than the permitted allowable emissions limit of 0.013 lb/MMBtu. During the compliance test, CT 3 had the highest rate of NO_x at 0.008 lb/MMBtu.

Carbon Monoxide (CO):

- During initial compliance testing, the CO emission rates from the unit were less than the permitted allowable emissions limits of 0.117 lb/MMBtu when firing the turbine only and 0.1 lb/MMBtu during times when power augmentation is in operation. During the compliance tests, the highest values recorded for CO were 0.0035 lb/MMBtu and 26.52 lb/hr.

Volatile Organic Compounds (VOC):

- During initial compliance testing, the VOC emission rate from the unit was approximately 0.0026 lb/MMBtu, which is less than the permitted allowable emissions limits of 0.0131 lb/MMBtu.

Green House Gases (GHG):

- According to AP-42 Tables 3.1-2a, the expected GHG emission rate from these units would be 110 lb/MMBtu.
- The facility reported a total of PTE of 3,249,367 Tons for all 3 units.

Periodic monitoring and CAM

Particulate Matter (PM) and Opacity:

Based on the expected levels of emissions as compared to the regulatory allowable emission limits, periodic monitoring of opacity and particulate matter emissions is not considered necessary. Additionally, the only control device for the CT is an SCR that is only used to control NO_x emissions; therefore, CAM is not applicable to PM and Opacity.

Sulfur Dioxide (SO₂):

As stated within the NSPS regulations for gas turbines, periodic monitoring for SO₂ is not required based on the requirements for the units to only burn natural gas. Additionally, the only control device for the CT is an SCR that is only used to control NO_x emissions; therefore, CAM is not applicable to SO₂.

Nitrogen Oxides (NO_x):

The combined-cycle combustion turbine units are required by the current Title V and PSD permits to operate continuously on each exhaust stack a NO_x continuous emission monitoring system (CEMS). The CEMS is used to demonstrate compliance with the best available control technology (BACT) emission limits, the Acid Rain Program, and the CSAPR Rule. The combined-cycle combustion turbine units meet specific CAM exemptions (40 CFR 64.2(b)(1)(vi)), thereby making CAM regulation non-applicable for these units.

VOC and CO:

Based on the results of the initial compliance testing and the expected levels of emissions as compared to the regulatory allowable emission limits, no periodic monitoring of VOC and CO emissions is considered necessary. Additionally, the only control device for the CT is an SCR that is only used to control NO_x emissions; therefore, CAM is not applicable to VOC and CO.

Cross-State Air Pollution Rule

- These units are subject to the applicable provisions of Cross-State Air Pollution Rule (CSAPR) to include all applicable provisions of the SO₂ Group 2 Trading Program requirements.

(ADEM Admin. Code r. 335-3-5-.07 through 335-3-5-.36)

- These units are subject to the applicable provisions of Cross-State Air Pollution Rule (CSAPR) to include all applicable provisions of the NO_x Annual Trading Program requirements.

(ADEM Admin. Code r. 335-3-8-.07 through 335-3-8-.70)

Recommendation:

Based on the above analysis and pending the resolution of any comments received during the 30-day public comment period and 45 day EPA review, I recommend issuing the attached renewal MSOP for Morgan Energy, LLC.



Tyler Phillips
Industrial Minerals Section
Energy Branch
Air Division

October 22, 2020

Date