STATEMENT OF BASIS

Alabama Power Company
Theodore Cogeneration Plant
Theodore, Alabama
Mobile County
503-8073

This proposed renewal to the 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 October 11, 2004. 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 September 30, 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.

The Theodore Cogeneration Plant is owned and operated by Alabama Power Company (APC) and is located in Theodore, Alabama. The Theodore Cogeneration Plant is a cogeneration facility that provides steam to the nearby Degussa Corporation and the INEOS-Phenol, Inc. facility. The Theodore Cogeneration Plant also generates approximately 210 megawatts (MW) of electric power for distribution to Alabama Power customers.

The Theodore Cogeneration Plant was issued its existing Major Source Operating Permit (MSOP) on March 15, 2016, with an expiration date of March 31, 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 September 30, 2020, but no earlier than September 30, 2019. An application for permit renewal was received by the Department on September 30, 2020. Additional information was received by the Department on January 25, 2021.

This Title V Major Source Operating Permit renewal will also incorporate changes since the issuance of the last Major Source Operating Permit. The changes being incorporated into the Title V are the following:

- Addition of an 805 HP (600 kW) Diesel Plant Emergency Generator
- Replacement of 220 MMBtu/hr Package Boiler w/ FGR (PB1R) with a 275 MMBtu/hr Package Boiler (Air Permit No. 503-8073-X004)

Additionally, the applicable requirements of Cross-State Air Pollution Rule (CSAPR) will be included in this renewal.

The significant sources of air pollutants at this facility are the following:

- 170 MW Combustion Turbine with 115 MMBtu/hr Duct Burner and Heat Recovery Steam Generator w/ SCR

- 275 MMBtu/hr Package Boiler w/ FGR (PB1R)
- 275 MMBtu/hr Package Boiler w/ FGR (PB2R)
- 208 HP Existing Emergency Firewater Pump
- 805 HP Plant Emergency Generator

Facility Wide Emissions

Pollutant	Potentials (TPY)	2019 Actuals (TPY)
NO_x	607	60.9
CO	969	16.1
VOC	151	1.22
SO_2	7.0	4.12
PM	393	26.3
HAPs (total)	14.0	6.8
GHG (CO_{2e})	1,343,758	793,926

170 MW Combustion Turbine with 115 MMBtu/hr Duct Burner

The combined cycle unit (combustion turbine and duct burner) fires only pipeline natural gas. The combustion turbine and the steam generator have the capability to generate electric power of approximately 170 MW and 40 MW, respectively. The duct burner has a heat input rating of 115 MMBtu/hr and provides the capability to produce additional steam from the heat recovery steam generator (HRSG). The NO_x emissions from the combined cycle unit are controlled by the use of Selective Catalytic Reduction (SCR).

The combined cycle unit was subject to a Prevention of Significant Deterioration (PSD) Review in which BACT was established for NO_x, CO, VOC, and PM. The combustion turbine is subject to the Federal New Source Performance Standards (NSPS) contained in 40 CFR Part 60, Subpart GG, and the duct burner is subject to NSPS, Subpart Db. The combined cycle unit is also subject to the Acid Rain Program and the Cross-State Air Pollution Rule (CSAPR). The combined cycle unit's expected emissions and the associated standards are listed below.

Emission Standards

Opacity:

- Visible Emissions from the combined cycle/duct burner stack shall not exceed 10%.

  (ADEM Admin. Code r. 335-3-14-.04(9)(b)) BACT

Particulate Matter (PM):

- Particulate emissions from the combined cycle/duct burner stack shall not exceed 0.012 lb/MMBtu and 23.6 lb/hr.

  (ADEM Admin. Code r. 335-3-14-.04(9)(b)) BACT

The PM emission standards apply at all times except during startup, shutdown, and load change; at which times the Permittee shall comply with

work practice standards.

Sulfur Dioxide (SO_2):

- The combined cycle unit is subject to the Acid Rain Regulations. This unit is not allocated SO_2 allowances under Phase II of the Acid Rain Program. This unit shall hold sufficient allowances in the unit account to cover annual SO_2 emissions.

  (ADEM Admin. Code r. 335-3-18-.01 and 40 CFR Part 73)

- The SO_2 emissions from the combustion turbine shall not exceed 150 ppmvd (at 15% O_2) or a fuel sulfur limit of 0.8% by weight.

  (40 CFR Part 60 Subpart GG, §60.333)

Nitrogen Oxides (NO_x):

- Nitrogen Oxides emissions from the combined cycle/duct burner stack shall not exceed 0.013 lb/MMBtu and 26.8 lbs/hr. The emissions limits are BACT limits resulting from a PSD review. These emission limits are *always* at least as stringent as those listed in 40 CFR 60 Subpart GG.

  (ADEM Admin. Code r. 335-3-14-.04(9)(b)) BACT

- The NO_x emissions from the combustion turbine shall not exceed :

$$STD = 0.0075\ \frac{(14.4)}{Y} + F$$

  Where:

$$STD = allowable\ NOx\ emission\ Concentration$$

$$Y = heat\ rate\ at\ manufacturer's\ rated\ load\ \left(\frac{KJ}{Whr}\right)$$

$$F = NOx\ emission\ allowance$$

  (40 CFR 60.332)

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

  (40 CFR Part 60 Subpart Db, §60.44b)

The NO_x emission standards apply at all times except during startup, shutdown, and load change; at which times the Permittee shall comply with work practice limitations.

Carbon Monoxide (CO):

- Carbon Monoxide emissions from the combined cycle/duct burner stack shall not exceed 0.086 lb/MMBtu and 176.6 lbs/hr. The emissions

limits are BACT limits resulting from a PSD review.

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

The CO emission standards apply at all times except during startup, shutdown, and load change; at which times the Permittee shall comply with work practice standards.

Volatile Organic Compounds (VOC):

- Volatile Organic Compound emissions from the combined cycle/duct burner stack shall not exceed 0.016 lb/MMBtu and 31.2 lbs/hr. The emissions limits are BACT limits resulting from a PSD review.

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

The VOC emission standards apply at all times except during startup, shutdown, and load change; at which times the Permittee shall comply with work practice standards.

Expected Emissions

Particulate Matter (PM) and Opacity:

- During initial performance testing, the PM emission rate was approximately 0.004 lb/MMBtu while firing the duct burners, which should represent the worst case emission rate. No visible emissions are expected from the unit while firing natural gas.

Sulfur Dioxide (SO_2):

- Natural gas is the primary fuel for this unit, resulting in an emission rate of approximately 0.0006 lb/MMBtu.

Nitrogen Oxides (NO_x):

- The unit is required to monitor NO_x with a Continuous Emissions Monitoring System (CEMS). CEMS data indicates that NO_x emissions from the combined cycle/duct burner are below the permitted emission limits. During the 2009 stack test for the unit, the NOx emissions were 0.003 lb/MMBtu for the combined cycle unit, which is below the permit limits.

Carbon Monoxide (CO):

- During the initial compliance testing, the CO emission rates from the unit were below the permitted allowable emissions limits. The CO emission rates for the combined cycle unit were 0.005 lb/MMBtu, and 9.7 lb/hr.

Volatile Organic Compounds (VOC):

- During initial compliance testing, the VOC emission rates from the

combined cycle unit were below the permitted allowable emissions limits. The VOC emission rates for the combined unit were approximately 0.0001 lb/MMBtu, and 0.24 lb/hr.

Greenhouse Gases (GHG):

- The estimated potential greenhouse gas emissions for the unit are 1,057,064 CO_{2e} tons/yr.

Periodic Monitoring

Particulate Matter (PM) and Opacity:

- Based on the low expected levels of emissions as compared to the regulatory allowable emission limits, periodic monitoring of opacity and particulate matter emissions is not considered necessary.

Sulfur Dioxide (SO_2):

- Periodic monitoring for SO_2 is not required based on the requirements for the units to only burn natural gas.

Nitrogen Oxides (NO_x):

- This unit is required by 40 CFR Part 75 to maintain and operate a NO_x Continuous Emissions Monitoring System (CEMS). The NOx CEMS will be utilized for periodic monitoring of NO_x emissions.

Carbon Monoxide (CO) and Volatile Organic Compounds (VOC):

- Based on the low expected levels of emissions as compared to the regulatory allowable emission limits, periodic monitoring of CO and VOC emissions is not considered necessary.

Recordkeeping and Reporting

- An excess emissions report for the combined turbine/duct burner stack as defined by 40 CFR Part 60, Subpart A, §60.7(c) and (d), will be submitted to the ADEM within thirty days of the end of each calendar quarter.

  (40 CFR Part 64 and ADEM Admin. Code r. 335-3-16-.05(c))

- The permittee shall submit the applicable report(s) to the Department according to the requirements of the Greenhouse Gas Reporting Rule in 40 CFR 98.

  (40 CFR Part 98)

Compliance Assurance Monitoring (CAM)

The only pollutant subject to Compliance Assurance Monitoring (CAM) is NO_x since the unit is utilizing a control device, SCR, to meet an applicable limit, and the pre-controlled potential NO_x emissions from the unit are greater than 100 TPY. Even though other pollutants' potential emissions are greater than the respective major source threshold, no control devices are used to meet any applicable limitations; therefore, CAM does not apply to those pollutants.

This unit is required by 40 CFR Part 75 to maintain and operate a NO_x Continuous Emissions Monitoring System (CEMS). The CEMS will also serve as the compliance assurance monitoring for NOx. Details of the CAM Plan are attached to this document.

Cross-State Air Pollution Rule

- This unit is subject to the applicable provisions of Cross-State Air Pollution Rule (CSAPR) to include all applicable provisions of the SO_2 Group 2 Trading Program requirements.

  (ADEM Admin. Code r. 335-3-5-.06 through 335-3-5-.36)

- This unit is subject to the applicable provisions of Cross-State Air Pollution Rule (CSAPR) to include all applicable provisions of the NOx Annual and Seasonal Trading Program requirements.

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

Two (2) 275 MMBtu/hr Package Boilers (PB1R and PB2R)

The two Package Boilers are fired by natural gas only. These boilers are normally used for backup purposes to ensure adequate steam supply to the nearby Degussa Corporation and INEOS-Phenol, Inc. facilities.

PB2R was issued a permit on January 6, 2015 and PB1R was issued a permit on May 3, 2016.

These boilers are subject to the Federal New Source Performance Standards (NSPS) contained in 40 CFR Part 60, Subpart Db. The expected emissions and the associated standards for the package boilers are listed below.

Emission Standards

Opacity:

- Any source of particulate emissions shall not discharge more than one 6-minute average opacity greater than 20% in any 60-minute period. At no time shall any source discharge a 6-minute average opacity of particulate emissions greater than 40%.

(ADEM Admin. Code r. 335-3-4-.01(1))

Particulate Matter (PM):

- The boilers shall not discharge PM in excess of 0.12 lb/MMBtu.

(ADEM Admin. Code r. 335-3-4-.03 Table 4-1)

Sulfur Dioxide (SO_2)

- These boilers have an allowable sulfur dioxide emission rate of 1.8 lbs/MMBtu.

(ADEM Admin. Code 335-3-5-.01(1)(a))

Nitrogen Oxides (NO_x):

- Nitrogen Oxide emissions shall not exceed 0.20 lb/MMBtu.

(40 CFR Part 60 Subpart Db, §60.44b)

Carbon Monoxide (CO):

- There are no applicable CO limits.

Volatile Organic Compounds (VOC):

- There are no applicable VOC limits.

Expected Emissions

Particulate Matter (PM) and Opacity:

- Emissions are expected to be 0.662 lb/hr and 2.90 TPY based on AP-42 and 8,760 hours per year of operation.

Sulfur Dioxide (SO_2):

- Natural gas is the primary fuel for these units, resulting in an emission rate of approximately 0.0006 lb/MMBtu.

Nitrogen Oxides (NO_x):

- These units are required to monitor NO_x with a Continuous Emissions Monitoring System (CEMS). CEMS data indicates that NO_x emissions from the 275 MMBtu/hr Package Boilers are below the permitted emission limits.

Carbon Monoxide (CO):

- PB1R Emissions are expected to be 20.4 lb/hr and 89.13 TPY based on vendor data and 8,760 hours per year of operation.

- PB2R Emissions are expected to be 23.43 lb/hr and 102.63 TPY based on vendor data and 8,760 hours per year of operation.

Volatile Organic Compounds (VOC):

- PB1R Emissions are expected to be 1.38 lb/hr and 6.02 TPY based on vendor data and 8,760 hours per year of operation.

- PB2R Emissions are expected to be 1.93 lb/hr and 8.45 TPY based on vendor data and 8,760 hours per year of operation.

Periodic Monitoring

Particulate Matter (PM) and Opacity:

- Based on the low expected levels of emissions as compared to the regulatory allowable emission limits, periodic monitoring of opacity and particulate matter emissions is not considered necessary.

Sulfur Dioxide (SO_2):

- Based on natural gas being the exclusive fuel for the boilers and the low expected SO_2 emissions, no periodic monitoring of SO_2 emissions is considered necessary.

Nitrogen Oxides (NO_x):

- The NO_x emission rate from these units shall be monitored by a NO_x Continuous Emissions Monitoring System (CEMS). The NO_x emission rate shall be monitored on a 30-day rolling average. The NO_x CEMS shall be maintained and certified using the procedures of 40 CFR 60.

Carbon Monoxide (CO) and Volatile Organic Compounds (VOC):

- There are no applicable limitations for CO and VOC emissions, therefore, no monitoring is needed.

Recordkeeping and Reporting

- Within 30 days after the end of each calendar quarter, the permittee will submit an excess NO_x emissions report (EER) to the Department. This report shall contain all the applicable information required by 40 CFR 60.49b.

  (40 CFR 64.49b)

- The permittee shall maintain records verifying that only natural gas was combusted in the package boilers.

  (40 CFR 64.49b(r))

- The permittee shall submit the applicable report(s) to the Department according to the requirements of the Greenhouse Gas Reporting Rule in 40 CFR Part 98.

(40 CFR Part 98)

Compliance Assurance Monitoring (CAM)

As these units are only subject to a NOx limit under an NSPS promulgated after November 15, 1990, the auxiliary boilers are **not** subject to CAM for NO_x according to §64.2(b)(1)(i).

Even though other pollutants' potential emissions are greater than the respective major source threshold, no control devices are used to meet any applicable limitations; therefore, CAM does not apply to those pollutants.

MACT Subpart ZZZZ – Existing Emergency Firewater Pump

This emergency firewater pump is subject to 40 CFR 63, Subpart ZZZZ, because it was manufactured before the applicability dates in 40 CFR Part 60 Subpart IIII. This emergency generator is not subject to 40 CFR Part 60 Subpart IIII (Standards of Performance for Stationary Compression Ignition Internal Combustion Engines) because this generator was manufactured before the applicability date of April 1, 2006. This emergency generator is subject to the applicable requirements in 40 CFR Part 63 Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines (RICE)).

Source #	HP	Fuel
004	208	Diesel

NSPS Subpart IIII

Subpart IIII applies to owners and operators of engines that commence construction after July 11, 2005, where the engines are manufactured on or after July 1, 2006. This compression ignition firewater pump was manufactured before April 1, 2006; therefore, Subpart IIII does not apply.

(40 CFR Part 60 Subpart IIII, §60.4200(a)(3))

MACT Subpart ZZZZ

Emission Standards

- This unit is subject to the applicable requirements listed in Table 2d of 40 CFR 63 Subpart ZZZZ—National Emissions Standards for

Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines.

(40 CFR Part 63 Subpart ZZZZ, §63.6602)

- The Permittee must operate and maintain this unit according to the manufacturer's emission-related written instructions or develop a maintenance plan which must provide to the extent practicable for the maintenance and operation of the engine in a manner consistent with good air pollution control practice for minimizing emissions.

  (40 CFR Part 63 Subpart ZZZZ, §63.6625(e)(3))

- The Permittee must install a non-resettable hour meter for each unit if one is not already installed.

  (40 CFR Part 63 Subpart ZZZZ, §63.6625(f))

- This unit may be operated for the purpose of maintenance checks and readiness testing, provided that the tests are recommended by Federal, State or local government, the manufacturer, the vendor, or the insurance company associated with the engine. Maintenance checks and readiness testing of this unit is limited to 100 hours per year. There is no time limit on the use of this unit in emergency situations. The owner or operator may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner or operator maintains records indicating that Federal, State, or local standards require maintenance and testing of emergency ICE beyond 100 hours per year . This unit may operate up to 50 hours per year in non-emergency situations, but those 50 hours are counted towards the 100 hours per year provided for maintenance and testing. The 50 hours per year for non-emergency situations cannot be used for peak shaving or to generate income for a facility to supply power to an electric grid or otherwise supply non-emergency power as part of a financial arrangement with another entity. Any operation other than emergency operation, maintenance and testing, and operation in non-emergency situations for 50 hours per year, as permitted in 40 CFR 63 Subpart ZZZZ, is prohibited.

  (40 CFR Part 63 Subpart ZZZZ, §63.6640(f))

Expected Emissions

The expected emissions are based on AP-42 emission factors, manufacturer’s certifications, and a maximum operation of 500 hours

per year. The expected emissions of the firewater pump engine subject to Subpart ZZZZ – Existing Firewater Pump Emergency Engines are shown below:

Pollutant	208 HP Firewater Pump	
	lb/hr	TPY
PM_{10}/ $PM_{2.5}$	0.49	0.12
SO_2	0.46	0.11
NO_X	6.96	1.74
CO	1.50	0.375
CO_2e	258.3	64.6

MACT Monitoring

The Permittee shall perform the following activities:

(a) Change oil and filter every 500 hours of operation or annually, whichever comes first;
(b) Inspect air cleaner every 1,000 hours of operation or annually, whichever comes first;
(c) Inspect all hoses and belts every 500 hours of operation or annually, whichever comes first, and replace as necessary.

Or utilize an oil analysis program as describe in §63.6625(i) or §636625(j).

(40 CFR Part 63 Subpart ZZZZ, Table 2d & §63.6625(i))

If an oil analysis program is utilized for a stationary compression ignition engine, the Permittee must perform the oil analysis at the same frequency specified above for changing the oil. The Permittee must at a minimum analyze the following parameters: Total Base Number, viscosity, and percent water content. The condemning limits for these parameters are as follows: Total Base Number is less than 30 percent of the Total Base Number of the oil when new, viscosity of the oil has changed by more than 20 percent from the viscosity of the oil when new, or percent water content (by volume) is greater than 0.5. If any of the limits are exceed, the Permittee must change the oil within 2 business days of receiving the results of the analysis or before commencing operation, whichever is later.

(40 CFR Part 63 Subpart ZZZZ, §63.6625(i))

CAM

This source is uncontrolled; therefore, CAM does not apply.

Recordkeeping and Reporting

If utilized, the Permittee must keep records of the parameters that are analyzed as part of the oil analysis program, the results of the analysis, and the oil changes for the engine. The analysis program must be part of the maintenance plan for the engine. These records shall be maintained in a manner suitable for inspection for a period of 5 years from record generation.

(40 CFR Part 63 Subpart ZZZZ, §63.6625(i))

The Permittee must keep records of the maintenance conducted on these units in order to demonstrate that you operated and maintained these units and after-treatment control device (if any) according to your own maintenance plan or according to manufacturer's written instructions. These records shall be maintained in a manner suitable for inspection for a period of 5 years from record generation.

(40 CFR Part 63 Subpart ZZZZ, §63.6655(e))

The Permittee must keep records of the hours of operation of each engine that is recorded through the non-resettable hour meter. The facility must document how many hours are spent for emergency operation; including what classified the operation as emergency and how many hours are spent for non-emergency operation. These records shall be maintained in a manner suitable for inspection for a period of 5 years from record generation.

(40 CFR Part 63 Subpart ZZZZ, §63.6655(f))

Plant Emergency Generator

The 805 HP (600 kW) Plant emergency engine is powered by diesel and subject to 40 CFR Part 60, Subpart IIII. The expected emissions and the associated standards for the plant emergency generator are listed below.

Source #	HP	Fuel
005	805	Diesel

NSPS Subpart IIII

Subpart IIII applies to owners and operators of engines that commence construction after July 11, 2005, where the engines are manufactured on or after July 1, 2006. This compression ignition emergency engine was manufactured after April 1, 2006; therefore, Subpart IIII does apply.

(40 CFR Part 60 Subpart IIII, §60.4200(a)(3))

By meeting the applicable requirements of 40 CFR Part 60 Subpart IIII, this unit is considered to be in compliance with 40 CFR Part 63 Subpart ZZZZ.
40 CFR 63.6590(c))

Emission Standards

Opacity:

- These units shall not discharge more than one 6-minute average opacity greater than 20% in any 60-minute period. At no time shall these units discharge a 6-minute average opacity of particulate emissions greater than 40%.

(ADEM Admin. Code r. 335-3-4-.01)

NMHC + NOx, PM, and CO:

- Owners and operators of 2007 model year and later emergency stationary CI ICE with a displacement of less than 30 liters per cylinder that are not fire pump engines must comply with the emission standards for new nonroad CI engines in §60.4202, for all pollutants, for the same model year and maximum engine power for their 2007 model year and later emergency stationary CI ICE.

(40 CFR Part 60 Subpart IIII, §60.4205(b))

Expected Emissions

The expected emissions shown below are based on AP-42 emission factors, manufacturer's data, and a maximum operation of 500 hours per year. CO2e emissions were based on 40 CFR Part 98 emission factors.

Pollutant	Plant Emergency Engine	
	lb/hr	TPY
PM_{10}/ $PM_{2.5}$	0	0
SO_2	0.01	0.002
NO_X	10.3	2.57
CO	0.89	0.22
CO_2e	899.5	224.9

Monitoring
Based on the low levels or expected emissions from these units, no monitoring is necessary for this unit.

Recordkeeping and Reporting

- The permittee shall keep records of the operation of this engine in emergency and non-emergency service that are recorded through the non-resettable hour meters. The permittee must also record the time of operation of the engine and the reason the engine was in operation during that time.

  40 CFR 60.4214(b)

Compliance Assurance Monitoring (CAM)
This unit has no pollution control equipment. Therefore, CAM does not apply.

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 Alabama Power-Theodore Cogeneration Plant.

Tyler Phillips
Industrial Minerals Section
Energy Branch
Air Division

Date