ENGINEERING ANALYSIS
SPIRE ALABAMA, INC. - COOSADA LNG FACILITY
COOSADA, ELMORE COUNTY, ALABAMA
FACILITY NO. 205-0008
SMOP NOS. X016-X019

The Air Division received a complete application on December 10, 2024, from Spire Alabama, Inc. (Spire), for the proposed construction of a new 1,464 hp Cummins four-stroke, lean burn, natural gas-fired emergency engine, a new 3.63 MMBtu/hr Tulsa regeneration heater, and a new flare system including a 27,590 lb/hr cold flare, a 1,502 lb/hr low-pressure flare, and a 190 scf/hr pilot light burner, and to obtain Synthetic Minor Operating Permits (SMOP) to reflect the facility's status change from a major source to a synthetic minor source under Title V regulations. After the proposed project, the facility would reclassify as a synthetic minor source under Title V regulations and remain a synthetic minor source under PSD regulations. Spire is currently operating under Major Source Operating Permit (MSOP) No. 205-0008 issued by the Department on December 8, 2021. This MSOP is set to expire on July 14, 2026. SMOP Nos. X016 - X019 would be issued for the proposed project.

Facility Operations

Spire owns and operates an existing liquefied natural gas (LNG) production and distribution facility (SIC 4925) located in Coosada, Elmore County. The significant sources of air pollutants at this facility include: one 1500 hp Ingersoll Rand natural gas-fired reciprocating engine (EU001), one 930 hp Caterpillar natural gas-fired emergency engine (EU002), three LNG product vaporizers (1 – 30.5 MMBtu/hr and 2 – 27.6 MMBtu/hr) (EU003-EU005, respectively), and one 3.34 MMBtu/hr GasTech H-100 regeneration heater (EU006). Insignificant emission sources at this station include a waste oil tank, a hexane tank, loading/unloading of LNG trucks, solvent metal cleaning, and fugitive emissions from ethylene glycol, ethylene, propane, liquefaction, and the vaporization process.

Proposed Project

The proposed project would include the removal of the 1500 hp Ingersoll Rand 4-stroke, lean burn, (4SLB) natural gas-fired engine (EU001), 930 hp Caterpillar 4-stroke, rich burn, (4SRB) natural gas-fired emergency engine (EU002), and 3.34 MMBtu/hr GasTech H-100 regeneration heater (EU006). The proposed project would include the installation of one 1,464 Cummins spark ignition, 4SLB, natural gas-fired emergency engine, one 3.63 MMBtu/hr Tulsa Heaters regeneration heater, two new flares, and a pilot light burner. The three existing vaporizer heaters (EU003-EU005) would remain at the facility as they are required for the vaporization system operations. The insignificant sources to be removed from the facility will include the waste oil tank, the hexane tank, the loading/unloading of LNG trucks, solvent metal cleaning, and fugitive emissions from ethylene glycol. Insignificant sources for liquid process fugitives (i.e., piping) would be included in the proposed project.

Proposed Decommissioned Equipment:

- 1500 hp Ingersoll Rand 4SLB Natural Gas-fired Engine w/ Oxidation Catalyst (EU001)
- 930 hp Caterpillar, 4SLB Natural Gas-fired Emergency Engine (EU002)
- 3.34 MMBtu/hr Gas Tech H-100 Regeneration Heater (EU006)
- Ethylene & Propane Fugitives (N005) (Insignificant)
- Waste Oil Tank (N007) (Insignificant)
- Hexane Tank (N008) (Insignificant)
- Ethylene Glycol Fugitives (N009) (Insignificant)

Proposed New Equipment:

- 1,464 hp Cummins Spark Ignition 4SLB Natural Gas-fired Emergency Engine

- 3.63 MMBtu/hr Tulsa Heaters Fired Regeneration Heater
- 190 scf/hr Pilot Light Burner
- 27,590 lb/hr Cold Flare[1]
- 1,502 lb/hr Low-Pressure[1] (LP) Flare

Existing Equipment:

- 30.5 MMBtu/hr LNG Vaporizer A (EU003)
- 27.6 MMBtu/hr LNG Vaporizer B (EU004)
- 27.6 MMBtu/hr LNG Vaporizer C (EU005)
- Liquefaction Process Fugitives (N006) (Insignificant)
- Liquefaction Storage Fugitives (N007) (Insignificant)
- Vaporization Process Fugitives (N008) (Insignificant)
- Solvent Metal Cleaning Operations (N009) (Insignificant)
- Truck Loading/Unloading Operations (N010) (Insignificant)

Emissions

The pollutants of concern emitted from the proposed equipment would be nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOC), and formaldehyde (CH_2O). Emissions of other criteria and hazardous air pollutants (HAP) were reviewed and determined to be insignificant. A facility-wide emissions summary is included as Appendix A. The unit-detailed emission calculations are included as Appendix B.

Proposed Facility-Wide Emissions

Table 1 – Facility-Wide Potential to Emit

Pollutant	Potential Emissions (TPY)	Title V Source Threshold (TPY)	Title V Threshold Exceeded?	PSD Source Threshold (TPY)	PSD Threshold Exceeded?
NO_x	23.99	100	No	250	No
CO	96.15	100	No	250	No
VOC	0.18	100	No	250	No
PM	2.47	100	No	250	No
PM_{10}	2.47	100	No	250	No
PM2.5	2.47	100	No	250	No
SO_2	0.40	100	No	250	No
CO_2e	37,196.00	N/A	No	N/A	No
Total HAP	0.31	25	No	-	-
Ethane[2]	0.11	10	No	-	-

[1] Spire is requesting one permit and one emission unit number for the entire flaring operation.
[2] Maximum single HAP is Ethane.

Proposed Permit Limitations

Table 2 – Facility Wide Potential to Emit

Emission Unit No.	Source Description	Operational Hours Limit	Volumetric Flow Limit
EU003	30.5 MMBtu/hr LNG Vaporizer A	1,500 hr/year combined	None
EU004	27.6 MMBtu/hr LNG Vaporizer B		None
EU005	27.6 MMBtu/hr LNG Vaporizer C		None
EU007	1,464 HP Cummins Emergency 4SLB SI RICE	None	None
EU008	3.63 MMBtu/hr Tulsa Regeneration Heater	3,000 hr/year	None
EU009	665.0 MMBtu/hr Cold Flare	None	324.5 MMscf/year
EU010	35.8 MMBtu/hr Low Pressure Flare	None	253.3 MMscf/year
EU011	190 scf/hr Flare Pilot Light	None	None

Applicability: Federal Regulations

Title V

Spire is currently operating as a Title V major source because the potential emissions for nitrogen oxides (NO_x) exceed the 100 TPY major source threshold. Spire has requested to retain the operational limit of 3,000 hr/yr for the proposed regeneration heater (Proposed EU008), and the combined operational limit of 1,500 hr/yr for the three existing LNG vaporizer units (EU003 – EU005) to limit NO_x and CO emissions below the 100 TPY major source thresholds; therefore, this facility would be considered a synthetic minor source under Title V regulations after the proposed project. The facility would remain a minor source of Hazardous Air Pollutants (HAP) because after the proposed project, individual HAP potential emissions would not exceed the major source threshold of 10 TPY, and total HAP potential emissions would not exceed the major source threshold of 25 TPY.

Prevention of Significant Deterioration (PSD)

According to an EPA Memorandum from July 31, 2003, the change of state of natural gas from a liquid to a gas (or vice-versa) takes place "without the need for chemical or process change that generally occurs at other sources that EPA considers as 'fuel conversion plants' (e.g., coal gasification, oil shale processing, conversion of municipal waste to fuel gas, processing of sawdust into pellets) under the PSD rules". This facility is not considered a fuel conversion plant since there is no chemical process change and would not be subject to the 100 TPY threshold for a fuel conversion plant. Therefore, because this facility is located in an attainment area for all criteria pollutants, the facility is subject to the 250 TPY criteria pollutant major source threshold for PSD regulations. Spire is currently considered a synthetic

minor source under PSD regulations because the facility-wide potential emissions for NO_x exceed 250 TPY without synthetic minor limitations. Spire has requested to retain the 3,000 hr/yr operational limit for the proposed regeneration heater (Proposed EU008), and the combined operational limit of 1,500 hr/yr for the three existing LNG vaporizer units (EU003 – 005) to limit NO_x emissions below the 250 TPY major source threshold. Additionally, Spire is requesting a 324.5 MMscf/yr and 253.3 MMscf/yr throughput for the proposed cold and low-pressure flares (EU009-EU010), respectively. After the proposed actions, the facility would remain a synthetic minor source under PSD regulations.

NESHAP

Per 40 CFR §63.2 the facility is considered an area source for hazardous air pollutants (HAP) when potential emissions do not exceed 10 tons per year or more of any single HAP or 25 tons per year or more of combined HAP.

40 CFR Part 63, Subpart ZZZZ, National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (Subpart ZZZZ) [Adopted by reference in ADEM Admin. Code r. 335-3-11-.06(103)]

Subpart ZZZZ applies to existing, reconstructed, and new engines at both major and area sources of HAPs. The proposed emergency engine would be considered an affected source under Subpart ZZZZ. The proposed unit would be classified as a new source because construction of the engine would commence after June 12, 2006, and the engine will be located at an area source of HAP. According to 40 CFR §63.6590(c), any new stationary RICE located at an area source of HAP emissions must meet the requirements of the Subpart ZZZZ by meeting the requirements of 40 CFR Part 60, Subpart JJJJ Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (Subpart JJJJ) for spark ignition engines. No further requirements would apply to the proposed emergency engine under Subpart ZZZZ.

NSPS

40 CFR Part 60, Subpart Dc, Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units (Subpart Dc) (Adopted by reference in ADEM Admin. Code r. 335-3-10-.02(2)(c))

Per 40 CFR §60.40c(a), based on the rated heat input capacities for the vaporizers of (30.5, 27.6, and 27.6 MMBtu/hr), respectively; therefore, the existing vaporizers would be subject to this Subpart. Spire would be subject to the applicable fuel usage recordkeeping and reporting requirements for each unit in accordance with 40 CFR §60.48c.

Per 40 CFR §60.40c(a), based on the rated heat capacity of the proposed 3.63 MMBtu/hr regeneration heater (EU 008), this unit would not be subject to Subpart Dc.

40 CFR Part 60, Subpart Kb, Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984, and On or Before October 4, 2023 (Subpart Kb) [Adopted by reference in ADEM Admin. Code r. 335-3-10-.02(9)(b)]

Subpart Kb applies to tanks storing volatile organic liquids (VOL) that were constructed, reconstructed, or modified after July 23, 1984, and on or before October 4, 2023, and have a capacity greater than 19,813 gallons or 75 cubic meters (m^3). Subpart Kb does not apply to storage vessels with a capacity greater than or equal to 151m^3 storing a liquid with a maximum true vapor pressure less than 3.5 kilopascals (kPa) or

with a capacity greater than or equal to 75 m^3 but less than 151 m^3 storing a liquid with a maximum true vapor pressure less than 15.0 kPa. The existing storage vessels at Spire store liquids with true vapor pressures of less than 3.5kPa; therefore, NSPS Subpart Kb is not applicable to the current LNG tank.

40 CFR Part 60, Subpart OOOO, Standards of Performance for Crude Oil and Natural Gas Facilities for Which Construction, Modification, or Reconstruction Commenced After August 23, 2011, and on or Before September 18, 2015 (Subpart OOOO) [Adopted by reference in ADEM Admin. Code r. 335-3-10-.02(91)]

The site is not an affected source for 40 CFR Part 60, Subpart OOOO because the facility is classified as a liquefied natural gas production and distribution operation (SIC 4925) which is located past the point of custody transfer to a local distribution company.

40 CFR Part 60, Subpart OOOOa, Standards of Performance for Crude Oil and Natural Gas Facilities for Which Construction, Modification or Reconstruction Commenced After September 18, 2015 and On or Before December 6, 2022 (Subpart OOOOa) [Adopted by reference in ADEM Admin. Code r. 335-3-10-.02(91)(a)]

The site is not an affected source for 40 CFR Part 60, Subpart OOOOa because the facility is classified as a liquefied natural gas production and distribution operation (SIC 4925) which is located past the point of custody transfer to a local distribution company.

40 CFR Part 60, Subpart OOOOb—Standards of Performance for Crude Oil and Natural Gas Facilities for Which Construction, Modification or Reconstruction Commenced After December 6, 2022 (Subpart OOOOb)

The construction of the proposed reciprocating engine, regeneration heater, and flaring equipment would occur after December 6, 2022; however, the site is not considered one of the affected sources for 40 CFR Part 60, Subpart OOOOb because the facility is classified as a liquefied natural gas production and distribution operation (SIC 4925) which is located past the point of custody transfer to a local distribution company.

40 CFR Part 60, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (Subpart JJJJ) [Adopted by reference in ADEM Admin. Code r. 335-3-10-.02(88)]

In accordance with 40 CFR §60.4230(a)(4)(iv), emergency engines with a horsepower rating greater than 25 are subject to Subpart JJJJ if construction commences (i.e. engine is ordered from the manufacturer) after June 12, 2006, and the engine is manufactured on or after January 1, 2009. The proposed emergency engine would be considered a new lean burn, 4-stroke engine with a rated capacity of 1,464 hp with a manufacture date of December 28, 2023, ordered in 2024; therefore, it would be subject to this Subpart.

Emission Limitations

In accordance with 40 CFR §60.4233(e) and Table 1 to Subpart JJJJ, the proposed emergency engine is required to meet a 2.0 g/Hp-hr or 160 ppmvd at 15% O_2 of NO_x, 4.0 g/Hp-hr or 540 ppmvd at 15% O_2 of CO, and 1.0 g/Hp-hr or 86 ppmvd at 15% O_2 of VOC. According to 40 CFR §60.4234, Spire must operate and maintain the proposed emergency engine in a manner that meets these emission standards over the entire life of the engine.

Compliance Requirements

40 CFR §60.4243(b)(1) states that an owner or operator of a stationary SI ICE complying with the emission standards specified in 40 CFR §60.4233(e) may demonstrate compliance by purchasing an engine certified to the emission standards. Spire has purchased a certified engine to comply with the Subpart.

Also, for the proposed emergency engine, 40 CFR §60.4243(d) limits the operation of the unit for the purpose of maintenance checks and readiness testing to no longer than 100 hours per year. Spire may operate the emergency engine 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, to generate income for a facility, or to supply power to an electric grid or otherwise supply 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 is prohibited.

40 CFR §60.4237(a) states that owners or operators of an emergency stationary SI internal combustion engine that is greater than 500 hp, was built on or after January 1, 2010, and does not meet the standards applicable to non-emergency engines, must install a non-resettable hour meter upon startup of the emergency engine.

Testing Requirements

No testing would be required because the proposed emergency engine is certified by the manufacturer.

Notification, Reports, and Records

40 CFR §60.4245(a) requires that owners and operators of all stationary SI ICE subject to this Subpart must keep records of all notifications submitted and all documentation supporting any notification. Records of all maintenance conducted on the engine must also be maintained. The owner or operator must document the number of hours spent on emergency operations, including the classification that designated the operation as an emergency, and the number of hours spent on non-emergency operations. All records required under this Subpart must be retained for at least two years from the date of generation and made available for inspection upon request.

Applicability: State Regulations

ADEM Admin. Code r. 335-3-4-.01, "Control of Particulate Emissions: Visible Emissions"

The existing and proposed equipment would be subject to the State visible emission standards of ADEM Admin. Code r. 335-3-4-.01(1), which states that no air emission source may emit particulate of an opacity greater than 20% (as measured by a six-minute average) more than once during any 60 minute period and at no time shall emit particulate of an opacity greater than 40% (as measured by a six-minute average).

ADEM Admin. Code r. 335-3-4-.02, "Fugitive Dust and Fugitive Emissions"

This rule is applicable. However, all plant roads are paved or graveled. There are no raw materials, storage piles, products, etc. capable of generating fugitive dust at this facility. Therefore, additional specific requirements for fugitive dust are not necessary for this facility.

ADEM Admin. Code r. 335-3-4-.03, "Control of Particulate Emissions: Fuel Burning Equipment"

Spire is located in Elmore County, which is classified as a Class II County for particulate emissions. However, in accordance with ADEM Admin. Code r. 335-3-4-.03(4), new sources (built after January 18, 1972) are subject to the rules and regulations for Class I Counties regardless of their location. Although the proposed emergency engine and flaring operation are fuel combustion sources, they would not be subject to any particulate matter (as TSP) emission limitation of ADEM Admin. Code Chap. 335-3-4 because the proposed emergency engine and flaring operation would not meet the definition of fuel-burning equipment. The existing vaporizers and the proposed regeneration heater would be considered fuel-burning equipment, and each unit is subject to the State particulate emission standard found in ADEM Admin. Code r. 335-3-4-.03(1) and is subject to the applicable emission rate for a new source as calculated by the equation $E = 1.38H^{-0.44}$, where E = emissions in lb/million BTU and H = heat input in millions of BTU/hr. Each of the existing vaporizers and the proposed regeneration heater would comply with the particulate emission standard because these units are each fired with natural gas.

ADEM Admin. Code r. 335-3-5-.01, "Control of Sulfur Compound Emissions: Fuel Combustion"

Spire is located in Elmore County, which is classified as a Class II County for sulfur oxide emissions. Although the proposed emergency engine and flaring operation are fuel combustion sources, they would not be subject to any sulfur dioxide (SO_2) emission limitation of ADEM Admin. Code r. 335-3-5-.01 because the proposed emergency engine and flaring operation would not meet the definition of fuel burning equipment. The existing vaporizers and the proposed regeneration heater would be subject to the SO_2 emission limitation of ADEM 335-3-5-.01(1)(b), which states that no person shall cause or permit the operation of a fuel burning installation in a Sulfur Dioxide Category II County in such a manner that sulfur oxides, measured as SO_2, are emitted in excess of 4.0 lb/MMBtu. The existing vaporizers and the proposed regeneration heater would be expected to comply with this standard because they would exclusively fire natural gas.

ADEM Administrative Code r. 335-3-5-.03(1), "Petroleum Production"

ADEM Admin. Code r. 335-3-5-.03(1), applies to facilities that handle natural gas or refinery gas that contains more than 0.10 grain of H_2S per standard cubic foot (H2S/scf). Spire would not be subject to this rule because the facility handles natural gas with an H_2S content less than 0.10 gr/scf.

ADEM Administrative Code, Chap 335-3-6, "Control of Organic Emissions"

ADEM Admin. Code Chap. 335-3-6 applies to the loading and storage of volatile organic compounds. Per ADEM Admin Code r. 335-3-6-.01(1)(b), this regulation does not apply to sources with the potential to emit less than 100 TPY of VOC. With the requested limitations associated with the proposed permitting action, the potential VOC emissions would be less than l00 TPY; therefore, Spire would not be subject to this rule.

Air Quality Impact

This facility is located in Elmore County, an attainment area for all criteria pollutants. It is not located within 100 km of any Class I Wilderness Area. Emissions from the proposed actions at this facility are not expected to significantly impact any of these areas.

Public Comment

A 15-day public comment period would be required because the proposed project would require the issuance of Synthetic Minor Operating Permits to establish federally enforceable limitations to limit the facility-wide CO and NO_x emissions below the Title V major source thresholds.

Recommendation

Based on the above analysis, I recommend that the Synthetic Minor Operating Permit (SMOP) Nos. X016-X019 be issued to Spire for the following existing and proposed equipment and associated operating limitations:

- **SMOP X016** -Three (3) LNG Production Vaporizers (One 30.5 MMBtu/hr and Two 27.6 MMBtu/hr)
- **SMOP X017** - 3.63 MMBtu/hr Tulsa Heaters Natural Gas-fired Regeneration Heater
- **SMOP X018** - 1,464 HP Cummins SI 4SLB Natural Gas-fired Emergency Engine
- **SMOP X019** - Flare Operations Including:
  - One (1) 27,150 lb/hr Cold Flare
  - One (1) 1,502 lb/hr Low Pressure Flare
  - One (1) 190 scf/hr Continuous Pilot Light for Flares

I also recommend that the cover letter transmitting these permits requests that Spire return the current Title V Major Source Operating Permit, issued on December 8, 2021, so that it may be voided.

Sabrina Klinner

Sabrina Klinner
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Chemical Branch
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April 29, 2025
Date

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