

NARRATIVE

TO: Jeng-Hon Su
FROM: Nada Osman
DATE: April 23, 2024

Facility Name: **Caterpillar Inc. – Griffin Facility**
AIRS No.: 255-00058
Location: Griffin, GA (Spalding County)
Application #: 29201
Date of Application: February 15, 2024

Background Information

Caterpillar Inc. – Griffin Facility (hereinafter “facility”) operates an engine manufacturing and testing facility at 560 Rehoboth Road in Griffin, Georgia. The facility is located in Spalding County, which is an attainment county for all criteria air pollutants. The facility is currently subject to emission caps of 99 tons per year (tpy), each, for nitrogen oxides (NO_x) and volatile organic compounds (VOC), as well as emission caps of 10 and 25 tpy for single and combined hazardous air pollutants (HAP), respectively. The facility is therefore a synthetic minor source. Emissions of all other criteria air pollutants are below their respective Title V major source thresholds.

The facility currently operates under Air Quality Permit No. 3621-255-0058-S-04-0, issued on August 29, 2023.

Purpose of Application

On February 15, 2024, the facility submitted Application No. 29201 requesting the addition of four engine test bays (ID Nos. TC-3 through TC-6) at its AMSOL test pad, as well as the addition of five fuel storage tanks (T-8 through T-12). A Public Advisory was issued for this application on February 21, 2024.

Updated Equipment List

Table 1: Equipment List

Emission Units		Associated Control Devices	
Source Code	Description	Source Code	Description
DTC1	Dyno Test Cell No. 1	--	--
DTC2	Dyno Test Cell No. 2	--	--
DTC3	Dyno Test Cell No. 3	--	--
DTC4	Dyno Test Cell No. 4	--	--

Emission Units		Associated Control Devices	
Source Code	Description	Source Code	Description
S-1	Gen. Set Test Cell No. 1	--	--
S-2	Gen Set Test Cell No. 2	--	--
S-3	Gen. Set Test Cell No. 3	--	--
S-4	Gen. Set Test Cell No. 4	--	--
WSTC1	Well Service Test Cell No. 1	--	--
WSTC2	Well Service Test Cell No. 2	--	--
TC-1	Power module engine test cell	--	--
TC-2	Power module engine test cell	--	--
TC-3	Power module engine test cell	--	--
TC-4	Power module engine test cell	--	--
TC-5	Power module engine test cell	--	--
TC-6	Power module engine test cell	--	--
S-11	Dyno Medium System Test Cell Heater for Test Cell Nos. 1 & 2	--	--
S-14	Dyno Medium System Test Cell Heater for Test Cell Nos. 3 & 4	--	--
S-18 & S-19	System Paint Booth	FF1	Fiberglass Filter
S-20 & S-21	Wash heaters, dryers, ovens	--	--
APA-1	Paint Booth	FAPA1	Fiberglass Filter
APA-9, APA-10, APA-11, and APA-13	Engine Touch-up Paint Booths	FAPA9, FAPA10, FAPA11, and FAPA13	Filtration Systems for the Touch up Paint Booths (Dry Filters)
S-27	Standby Diesel Generator No. 1 – Demo Unit	--	--
S-28	Standby Diesel Generator No. 2 – Utility Bldg.	--	--
S-29	Standby Diesel Generator No. 3 – Utility Bldg.	--	--
S-30	1.9 MW Natural Gas -fired Generator	--	--

New units are in bold

Table 2: Storage Tanks

Source Code	Capacity (gallons)	Contents	True Vapor Pressure (psia)
T-1	50,000	No. 2 Low Sulfur Diesel Fuel Storage Tank	8.6 E-03
T-2	12,000	Ethylene Glycol Coolant Storage Tank	8.0 E-02
T-5	5,000	Ethylene Glycol Coolant Storage Tank	8.0 E-02
T-6	1,250	Diesel Fuel Storage Tank	8.6 E-03
T-7	1,250	Diesel Fuel Storage Tank	8.6 E-03

Source Code	Capacity (gallons)	Contents	True Vapor Pressure (psia)
T-8	12,000	Diesel Fuel Storage Tank	8.6 E-03
T-9	4,000	Ethylene Glycol Coolant Storage Tank	8.0 E-02
T-10	300	Diesel Day Tank Storage	8.6 E-03
T-11	300	Diesel Day Tank Storage	8.6 E-03
T-12	300	Diesel Day Tank Storage	8.6 E-03

New units are in bold

Emissions Summary

The addition of the four test bays (ID Nos. TC-3 through TC-6) will increase the facility's maximum engine testing capacity from 34 engines to 317 engines annually. Engines will be tested for an average of 6 hours per test run with a maximum of three engines being tested at the same time. Potential emissions were calculated based on the maximum three engines operating simultaneously, for a total of 8,760 hours per year.

Table 3: Facility-wide Emissions (tpy)

Pollutant	Potential Emissions			Actual Emissions		
	Before Mod.	After Mod.	Emissions Change	Before Mod.	After Mod.	Emissions Change
PM/PM ₁₀ /PM _{2.5}	6.7	7.4	0.7	6.7	7.4	0.7
NO _x	99	99	0	58.1	92.5	34.4
SO ₂	6.1	6.2	0.1	6.1	6.2	0.1
CO	29.3	28.8	(0.5)	29.3	28.8	(0.5)
VOC	99	99	0	15.4	15.5	0.1
Max. Individual HAP	10	10	0	<10	<10	0
Total HAP	25	25	0	0.09	0.12	0.03
Total GHG (if applicable)	<100,000	<100,000	0	<100,000	<100,000	0

Regulatory Applicability

40 CFR 60 Subpart Kb – NSPS for Volatile Organic Liquid Storage Vessels

Subpart Kb applies to volatile organic liquid storage vessels with a capacity equal to or greater than 75 cubic meters (19,800 gallons). Tanks T-8 through T-12 all have a storage capacity less than 75 cubic meters and are therefore not subject to this Subpart.

Note that because existing Tank T-1 has a capacity greater than 151 cubic meters and its maximum true vapor pressure is less than 3.5 kilopascals, it is also not subject to this Subpart per 40 CFR 60.110b(b).

40 CFR 63 Subpart P P P P P – NESHAP for Engine Test Cells/Stands

Subpart P P P P P applies to engine test cell operations that are located at major sources of HAP emissions. Because the facility's single and combined HAP emissions are restricted to 10 and 25 tpy, respectively, this Subpart does not apply.

Georgia Rule 391-3-1-.02(2)(b) – Visible Emissions

Georgia Rule (b) limits the opacity of visible emissions from manufacturing processes to no more than 40%. Because all combustion equipment at the facility (including test engines) burns only distillate fuel oil or natural gas, PM emissions are inherently expected to be minimal and therefore compliant with Georgia Rule (b) limits.

Georgia Rule 391-3-1-.02(2)(d) – Fuel-Burning Equipment

Georgia Rule (d) limits the emission and opacity of PM from fuel burning-equipment based on heat input capacity. 391-3-1-.01(cc) defines fuel-burning equipment as "...equipment the primary purpose of which is the production of thermal energy from the combustion of any fuel. Such equipment is generally that used for, but not limited to, heating water, generating or super heating steam, heating air as in warm air furnaces, furnishing process heat indirectly, through transfer by fluids or transmissions through process vessel walls." The engines being tested at the new pads do not meet this definition and are therefore not subject to Georgia Rule (d).

Georgia Rule 391-3-1-.02(2)(g) – Sulfur Dioxide

Georgia Rule (g) limits fuel sulfur content to no more than 2.5% by weight. Because all combustion equipment at the facility fire natural gas or diesel fuel, fuel sulfur levels automatically comply with Georgia Rule (g) limits.

Georgia Rule 391-3-1-.02(2)(yy) – Emissions of NO_x from Major Sources

Facilities in Spalding County with NO_x emissions greater than 100 tpy are potentially subject to the RACT requirements of Georgia Rule (yy). Because the facility's NO_x emissions are capped at 99 tpy, RACT requirements do not apply to the modification.

Permit Conditions

Existing Condition 2.14 has been replaced with a new requirement, which restricts the facility to operating no more than 3 engine test cells simultaneously. The facility's toxic impact assessment (TIA) is based on this maximum testing capacity.

The proposed engine test cells will be subject to existing Conditions 2.1, 2.3, 2.4, 2.7, 5.1, 5.2, 7.1 through 7.5, and 7.9 through 7.11.

Toxic Impact Assessment

The modification will result in an increase in single and combined HAP emissions; therefore, in order to comply with Georgia Air Toxics Guidelines, the facility was required to perform a TIA. Facility-wide potential emissions of key HAP were compared with their respective minimum emission rates (MER). Potential emissions of acrolein, benzene, and formaldehyde each exceeded their respective MER.

Table 4: Facility-Wide PTE of Key HAP and Corresponding MER

Pollutant	Existing Source Emission Rate (lb/hr)	Proposed Source Emission Rate (lb/hr)	Combined Source Emission Rate (lb/yr)	MER (lb/yr)	Modeling Required?
Acrolein	0.07	8.01E-4	620	4.87	YES
Benzene	0.08	1.01E-2	789	31.6	YES
Formaldehyde	0.52	8.02E-3	4,630	267.0	YES

The modeling was conducted based on a maximum of three engine test stands running at any time. The 317 maximum engines that could be tested annually is the maximum number when up to three engine test cells operate at the same time. Emission rates (inputs to the modeling) are based on operating at most 3 engine test cells at the same time.

Because the proposed units emit horizontally, and the existing sources emit vertically, the sources cannot be merged into a single stack for the purposes of modeling. The existing sources were modeled in SCREEN3 as a single stack, as were the proposed sources. The modeling parameters for the two stacks are shown in Table 5. Note that building dimensions are included for building downwash analysis, and the proposed source parameters have been adjusted to account for the horizontal orientation of the stack.

Table 5: Modeling Parameters for Existing and Proposed Sources

Parameter	Existing Source Stack (S1)	Proposed Source Stack (S2) (Generator 3516E)
Stack Height (m)	19.81	4.27
Inside Stack Diameter (m)	0.76	116.8
Exit Velocity (m/s)	32.58	0.001
Stack Gas Exit Temp (K)	505	956.76
Building Height (m)	15.85	15.85
Minimum Horizontal Building Dim (m)	90	90
Minimum Horizontal Building Dim (m)	310	310

Based on a unit emission rate of 1 lb/hr, the unit MGLC of the existing source stack (S1) was found to be 5.9 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), located 100 meters from the stack. The unit MGLC of Generator 3516E (the most conservative proposed source) was found to be 24.7 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), located 100 meters from the stack.

Table 6: Summary of Toxic Impact Analysis

Pollutant	AAC, µg/m ³		SCREEN3 Modeling Results/MGCL, µg/m ³					Acceptability of the Predicted MGCL/Ambient Impact	
	15-Minute	Annual	1-Hour (Existing)	1-Hour (Proposed)	1-Hour (Total)	15-Minute	Annual	15-Minute	Annual Impact
Acrolein	23	0.35	0.39	0.02	0.41	0.54	0.03	Acceptable	Acceptable
Benzene	1600	0.13	0.47	0.25	0.72	0.95	0.06	Acceptable	Acceptable
Formaldehyde	245	1.10	3.06	0.20	3.26	4.30	0.26	Acceptable	Acceptable

The MGLCs from both existing and proposed sources were added together to achieve a total 1-hour MGLC. The short-term (15-minute) and long-term (annual) MGLC for acrolein, benzene, and formaldehyde are each below their respective acceptable ambient concentrations (AAC), and therefore all pollutants comply with the Georgia Air Toxics Guidelines. No further modeling is needed.

MER and AAC values for each HAP were referenced from Appendix A of the Summary of Ambient Impact Assessment of Toxic Air Pollutant Emissions (2018).

Summary & Recommendations

Caterpillar Inc. – Griffin Facility is a synthetic minor engine manufacturing facility located in Griffin, Georgia. Facility-wide emissions of NO_x and VOC are restricted to 99 tpy, each, and emissions of single/combined HAP are restricted to 10/25 tpy, respectively. The Stationary Source Compliance Program (SSCP) will continue to be responsible for inspection and compliance of this facility.

Addendum to Narrative

The 30-day public review started on month day, year and ended on month day, year. Comments were/were not received by the Division.