DRAFT ENGINEERING EVALUATION
Facility ID No. 203342
Chick-fil-A
1452 Mendocino Avenue, Santa Rosa, CA 95401
Application No. 689822

Background

Chick-fil-A is applying for an Authority to Construct (AC) for the following equipment:

S-1 Emergency Standby Natural Gas Engine with Integral Catalyst
Make: Kohler, Engine Family: PKHXB10.3TNL, Model: KG10V08T-6CGS, Model Year: 2023, 239 BHP, 1.967 MMBTU/hr

Emissions Calculations

Emission factors for nitrogen oxides (NOx), precursor organic compounds (POC), and carbon monoxide (CO) were obtained from the engine manufacturer. Particulate matter ($PM_{10}/PM_{2.5}$) and sulfur dioxide (SO_2) emission factors are based on AP 42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combustion Sources, Section 3.2.4.1 Control Techniques for 4-Cycle Rich-Burn Engines and Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines.[1] It is assumed that the abatement efficiency for POC is 50% by weight. The applicant confirmed that the proposed engine is equipped with an integral catalyst.

The engine will operate for emergencies and will be limited to a maximum of 50 hours per year for maintenance and testing.

Table 1. Hourly, Daily, and Annual Emissions from S-1

Pollutant	Abated Emission Factor (g/hp-hr)	Unabated Emission Factor (g-hp/hr)	Hourly Emissions (lb/hr)	Maximum Daily Emissions (lb/day)	Annual Emissions (lb/yr)	Annual Emissions (TPY)
NOx	0.231	-	0.122	2.923	6.089	0.003
POC	0.030	-	0.016	0.377	0.786	3.93E-04
CO	0.104	-	0.055	1.320	2.750	0.001
PM10/PM2.5	-	0.073	0.038	0.916	1.909	0.001
SO_2	-	0.002	0.001	0.028	0.058	2.89E-05

Basis:

- 259 bhp Max Rated Output
- 1,873.5 cf/hr Max fuel use Rate = 1.967 MMBTU/hr
- NOx, POC and CO emission factors are from the engine manufacturer.
- $PM_{10}/PM_{2.5}$ and SO_2 emission factors are from EPA AP-42, Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines. The $PM_{10}/PM_{2.5}$ emission factor is the total of filterable and condensable particulates.
- Annual Emissions are based on an annual limit (50 hr/yr) for testing and maintenance.
- Max daily emissions are based on 24 hr/day since no daily limits are imposed on emergency operations.

[1] **SO_2** Emission Factor = 5.88E-04 lb/MMBtu; calculations assume 100% of fuel sulfur conversion with the content in natural gas = 2000 gr/10^6scf. **$PM_{10}/PM_{2.5}$** fuel input emission factor = 9.50E-03 lb/MMBtu (filterable) + 9.91E-03 lb/MMBtu (condensable) = 1.94E-02 lb/MMBtu; aerodynamic particle diameter =< 1 µm, for the purposes of filterable emissions $PM_{10}= PM_{2.5}$. These emissions are expected to be negligible but included for completeness.

Toxic Risk Screen Analysis

Pursuant to Regulation 2-5-110, a project, including all new or modified sources of toxic air contaminants (TAC) within a 5-year period, is not subject to this rule if the total project emissions are below the acute and chronic trigger levels listed in Table 2-5-1 "Toxic Air Contaminant Trigger Levels" of this regulation.

The emission factors are from the California Air Toxics Emission Factors (CATEF) and the Compilation of Air Pollutant Emissions Factor: AP-42. CATEF emission factors are preferentially chosen over AP-42 factors. If the AP-42 emission factor is based on the detection limit, the emission factor will equal 1/2 of the AP-42 emission factor.

It is assumed that the abatement efficiency for POC is 50% by weight.

Table 2. Toxic Air Contaminant Review for S-1 Engine

Compound	Emission Factor After Integral Abatement (lb/MMBtu)	Basis	Abated Hourly Emission Rate (lb/hr)	Acute Trigger Level (lb/hr)	Abated Annual Emission Rate (lb/yr)	Chronic Trigger Level (lb/yr)	Exceeds Acute or Chronic Trigger Level?
1,1,2,2-Tetrachloroethane	2.53E-05	AP-42	2.5E-05	None	1.2E-03	1.4E+00	no
1,1,2-Trichloroethane	1.53E-05	AP-42	1.5E-05	None	7.5E-04	5.0E+00	no
1,1-Dichloroethane	1.13E-05	AP-42	1.1E-05	None	5.6E-04	5.0E+01	no
1,3-Butadiene	9.90E-05	CATEF	9.7E-05	1.5E+00	4.9E-03	4.8E-01	no
Acetaldehyde	8.41E-04	CATEF	8.3E-04	1.0E+00	4.1E-02	2.9E+01	no
Acrolein	5.21E-04	CATEF	5.1E-04	5.5E-03	2.6E-02	1.4E+01	no
Benzene (no control)	1.82E-03	CATEF	1.8E-03	6.0E-02	8.9E-02	2.9E+00	no
Carbon Tetrachloride	1.77E-05	AP-42	1.7E-05	4.2E+00	8.7E-04	1.9E+00	no
Chlorobenzene	1.29E-05	AP-42	1.3E-05	None	6.3E-04	3.9E+04	no
Chloroform	1.37E-05	AP-42	1.3E-05	3.3E-01	6.7E-04	1.5E+01	no
Ethylbenzene	1.10E-05	CATEF	1.1E-05	None	5.4E-04	3.3E+01	no
Ethylene Dibromide	2.13E-05	AP-42	2.1E-05	None	1.0E-03	1.1E+00	no
Formaldehyde (no control)	2.24E-03	CATEF	2.2E-03	1.2E-01	1.1E-01	1.4E+01	no
Methanol	3.06E-03	AP-42	3.0E-03	6.2E+01	1.5E-01	1.5E+05	no
Methylene Chloride	4.12E-05	AP-42	4.1E-05	3.1E+01	2.0E-03	8.2E+01	no
Naphthalene	7.29E-05	CATEF	7.2E-05	None	3.6E-03	2.4E+00	no
PAH Equivalent as Benzo(a)pyrene	1.73E-07	CATEF	1.7E-07	None	8.5E-06	3.3E-03	no
Propylene	1.52E-02	CATEF	1.5E-02	None	7.5E-01	1.2E+05	no
Styrene	1.19E-05	AP-42	1.2E-05	4.6E+01	5.9E-04	3.5E+04	no
Toluene	1.02E-03	CATEF	1.0E-03	8.2E+01	5.0E-02	1.2E+04	no
Vinyl Chloride	7.18E-06	AP-42	7.1E-06	4.0E+02	3.5E-04	1.1E+00	no
Xylene (total)	6.27E-04	CATEF	6.2E-04	4.9E+01	3.1E-02	2.7E+04	no

The project does not exceed any acute or chronic trigger level. Therefore, the project is not subject to the requirements of Regulation 2-5-110.

Best Available Control Technology (BACT)

Pursuant to Regulation 2-2-301, Best Available Control Technology (BACT) shall apply to new or modified sources with a Potential to Emit equal to or greater than 10 lb per highest day of the pollutants in Table 1.

BACT is not triggered for any pollutant since the maximum daily emission of each pollutant does not exceed 10 lb/day.

Plant Cumulative Emissions

Table 3 summarizes the cumulative increase in criteria pollutant emissions that will result from the operation of S-1.

This is a new facility. Therefore, there are no existing emissions.

Table 3. Plant Cumulative Emissions Increase, Post 4/5/91

Pollutant	Existing Emissions Post 4/5/91 (ton/yr)	Application Emissions (ton/yr)	Cumulative Emissions (ton/yr)
NOx	0.000	0.003	0.003
POC	0.000	3.93E-04	3.93E-04
CO	0.000	0.001	0.001
PM10	0.000	0.001	0.001
PM2.5	0.000	0.001	0.001
SO2	0.000	2.89E-05	2.89E-05

Table 4 below summarizes Potential to Emit (PTE) breakdown for the facility. S-1 is the only source at this facility.

Table 4. Potential to Emit (tons/year)

Source	Description	NOx	POC	CO	$PM_{10}/PM_{2.5}$	SO_2	Relevant Application
1	Emergency Backup Generator	0.003	3.93E-04	0.001	0.001	2.89E-05	Current

Per "Policy: Calculating potential to Emit for Emergency Backup Power Generators", the sum of 100 hours of annual emergency operation, and 50 hours of annual discretionary operation will be used for determining the potential to emit (PTE) for each emergency engine.

Therefore, the following total annual operation hours are used for the PTE calculations of the S-1 Emergency Backup Generator.

S-1 Emergency Backup Generator:
= 50 hours of annual discretionary operation + 100 hours of emergency annual operation = 150 hours of total annual operation hours

Offsets

Offset must be provided for any new or modified source at a facility that will have the potential to emit more than 10 tons per year of NOx or POC, as specified in Regulation 2-2-302; 100 tons per year or more of PM2.5, PM10 or sulfur dioxide, as specified in Regulation 2-2- 303.

Per "Policy: Calculating potential to Emit for Emergency Backup Power Generators", emergency engine PTE at 150 hours/year will not be used to determine the amount of offsets required. Therefore, 50 hours/year of emergency engine emissions will be used for the emissions calculation for S-1 engine.

Table 5. Offset Trigger Calculation for Plant 203342

Pollutant	Existing Annual Emissions (ton/yr)	Application Annual Emission (ton/yr)	Facility Annual Emissions (ton/yr)	Offset Requirement (ton/yr)	Offset Required?
NOx	0.000	0.003	0.003	10	N
POC	0.000	3.93E-04	3.93E-04	10	N
CO	0.000	0.001	0.001	-	N
PM10	0.000	0.001	0.001	100	N
PM2.5	0.000	0.001	0.001	100	N
SO2	0.000	2.89E-05	2.89E-05	100	N

Statement of Compliance

Regulation 6-1-303 (*Ringelmann No. 2 Limitation*)
Regulation 6-1-310 (*Total Suspended Particulate (TSP) Concentration Limits; see below*)
Regulation 9-1-301 (*Limitations on Ground Level Concentrations of SO_2*)
Regulation 9-8 (*NOx and CO from Stationary Internal Combustion Engines*)
Section 9-8-110.5 – Limited exemption for emergency standby engines
Section 9-8-330 – Hours of operation for emergency standby engines
Section 9-8-502 – Recordkeeping

The owner/operator is expected to comply with Reg. 6-1 (*Particulate Matter and Visible Emissions Standards*), since the unit is fueled with natural gas. Thus, for any period aggregating more than three minutes in any hour, there should be no visible emission as dark or darker than No. 1 on the Ringlemann Chart (Regulation 6-1-301) and no visible emission to exceed 20% opacity (Reg. 6-1-302).

The owner/operator of S-1 shall comply with Reg. 9-1-301 (*Inorganic Gaseous Pollutants: Sulfur Dioxide for Limitations on Ground Level Concentrations*). From Regulation 9-1-301, the ground

level concentrations of SO_2 will not exceed 0.5 ppm continuously for 3 consecutive minutes or 0.25 ppm averaged over 60 consecutive minutes, or 0.05 ppm averaged over 24 hours.

S-1 is an emergency standby generator; from Regulation 9, Rule 8 (*NOx and CO from Stationary Internal Combustion Engines*), Section 110.5 (*Emergency Standby Engines*), S-1 is exempt from the requirements of Regulations 9-8-301 (*Emission Limits on Fossil Derived Fuel Gas*), 9-8-302 (*Emission Limits on Waste Derived Fuel Gas*), 9-8-303 (*Emissions Limits – Delayed Compliance, Existing Spark-Ignited Engines, 51 to 250 bhp or Model Year 1996 or Later*), 9-8-304 (*Emission Limits – Compression-Ignited Engines*), 9-8-305 (*Emission Limits – Delayed Compliance, Existing Compression-Ignited Engines, Model Year 1996 or Later*), 9-8-501 (*Initial Demonstration of Compliance*) and 9-8-503 (*Quarterly Demonstration of Compliance*).

Allowable operating hours and the corresponding record keeping in Regulations 9-8-330 (*Emergency Standby Engines, Hours of Operation*) or Regulation 9-8-331 (Essential Public Service, Hours of Operation) and 9-8-530 (*Emergency Standby Engines, Monitoring and Recordkeeping*) will be included in the Permit Conditions below.

Public Notification (Regulation 2-1-412)

The facility is not located within an overburdened community. However, S-1 Engine is located within 1,000 feet of Santa Rosa High School. Therefore, public notification is required, per Regulation 2-1-412.

The following school is located within ¼ mile of S-1 Engine:

- **Santa Rosa High School**

(1235 Mendocino Avenue, Santa Rosa, CA 95401)

California Environmental Quality Act (CEQA)

The project is considered to be ministerial under the District's CEQA regulation 2-1-311 and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emissions factors and therefore is not discretionary as defined by CEQA. (Permit Handbook Chapter 2.3.2)

New Source Performance Standards

The New Source Performance Standard (NSPS) in 40 CFR 60, Subpart JJJJ apply because the engine will be installed after January 1, 2011. The engine will comply with the following limits in Table 1 for spark-ignited engines with model years later than 2007:

Pollutant	S-1 Emission Factor	NSPS Standard
HC	0.31 g/kW-hr	0.135 g/kW-hr
NOx	0.04 g/kW-hr	2.565 g/kW-hr
CO	0.14 g/kW-hr	4.4 g/kW-hr

As the information above shows, S-1 is in compliance with these NSPS emission requirements.

National Emission Standards for Hazardous Air Pollutants (NESHAP)

This engine will be operated at a hazardous air pollutant (HAP) area source. Therefore, the engine will be subject to the Reciprocating Internal Combustion Engine (RICE) National Emission Standards for Hazardous Air Pollutants (NESHAP) (40 CFR Part 63, Subpart ZZZZ) because it is a new source and installed after 2007. A new RICE at an area source that is subject to 40 CFR Part 60, Subpart JJJJ, has no further requirements under 40 CFR Part 63, Subpart ZZZZ pursuant to 40 CFR Part 63.6590(c). Therefore, S-1 complies with the NESHAP by meeting the requirements under 40 CFR Part 60, Subpart JJJJ.

Permit Conditions

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1. Operating time for reliability related activities is limited to 50 hours per year per engine. (Basis: Regulation 9-8-330.3)
2. The owner/operator shall operate the stationary emergency standby engine only for the following purposes: to mitigate emergency conditions, for emission testing to demonstrate compliance with a District, State or Federal emission limit, or for reliability related activities (maintenance and other testing but excluding emission testing). Operating while mitigating emergency conditions or while emission testing to show compliance with District, state, or Federal emission limits is not limited. (Basis: Regulation 9-8-330)
3. The owner/operator shall operate each emergency standby engine(s) only when a non-resettable totalizing meter (with a minimum display capability of 9,999 hours) that measures the hours of operation for the engine is installed, operated and properly maintained. (Basis: Regulation 9-8-530)
4. The owner/operator shall not operate the natural gas fired engine unless it is abated with an integral or add-on three-way catalyst, or other approved abatement device. (Basis: Cumulative Increase)
5. Records: The owner/operator shall maintain the following monthly records in a District approved log for at least 24 months from the date of entry (60 months if the facility has been issued a Title V Major Facility Review Permit or a Synthetic Minor Operating Permit). Log entries shall be retained on site, either at a central

location or at the engine's location, and made immediately available to the District staff upon request.

a. Hours of operation for reliability related activities (maintenance and testing).
b. Hours of operation for emission testing.
c. Hours of operation (emergency).
d. For each emergency, the nature of the emergency condition.
e. Fuel usage or operating hours for engine.

(Basis: Regulations 9-8-502 and 9-8-530)

Recommendation

The Air District has reviewed the material contained in the permit application for the proposed project and has made a preliminary determination that the project is expected to comply with all applicable requirements of District, state, and federal air quality-related regulations. The preliminary recommendation is to issue an Authority to Construct for the equipment listed below. However, the proposed source triggers public notification requirements per Regulation 2-1-412. After the comments are received from the public and reviewed, the Air District will make a final determination on the permit.

I recommend that the District initiates a public notice and consider any comments received prior to taking any final action on issuance of an Authority to Construct and/or a Permit to Operate for the following equipment:

S-1 Emergency Standby Natural Gas Engine with Integral Catalyst
Make: Kohler, Engine Family: PKHXB10.3TNL, Model: KG10V08T-6CGS,
Model Year: 2023, 239 BHP, 1.967 MMBTU/hr

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January 9, 2024