

ENGINEERING EVALUATION

Facility ID: 202362
CCSF – MUB (Multi-Use Building)
50 Frida Kahlo Way, San Francisco, CA 94112 (North West of Batmale Hall Building)
Application #712469

Background

CCSF – MUB (Multi-Use Building) is applying for an Authority to Construct/Permit to Operate for the following equipment:

S-3 Emergency Standby Natural Gas (NG) Engine
Make: Generac, Model: SG-130, Model Year: 2016
230.30 bhp, 1.89 MMBtu/hr

Emission Calculations

Emission factors for nitrogen oxides (NO_x), precursor organic compounds (POC), and carbon monoxide (CO) were obtained from the engine manufacturer. Particulate matter (PM₁₀/PM_{2.5}) and sulfur dioxide (SO₂) 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 Engines¹. 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-3

Pollutant	Emission Factor (g/bhp-hr)	Hourly Emissions (lb/hr)	Maximum Daily Emissions (lb/day)	Annual Emissions (lb/yr)	Annual Emissions (ton/yr)
NO _x	0.03	0.02	0.4	1	0.000
POC	0.1	0.05	1.2	3	0.001
CO	0.02	0.01	0.2	1	0.000
PM ₁₀ /PM _{2.5}	0.07	0.04	0.9	2	0.001
SO ₂	2.19E-03	0.00	0.0	0	0.000

Basis:

- 230.30 bhp max rated output.
- 1,797 scf/hr max fuel use rate = 1.89 MMBtu/hr (using a natural gas heat content of 1050 Btu/scf).
- NO_x, POC, and CO emission factors are from the engine manufacturer.
- PM₁₀/PM_{2.5} and SO₂ emission factors are from EPA AP-42, Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines. The PM₁₀/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.
- Maximum daily emissions are based on 24 hr/day since no daily limits are imposed on emergency operations.

¹ SO₂ emission factor = 5.88 E-04 lb/MMBtu; calculations assume 100% of fuel sulfur conversion with content in natural gas = 2000 gr/10⁶ scf. PM₁₀/PM_{2.5} 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, PM₁₀= PM_{2.5}. These emissions are expected to be negligible but are 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. **Table 2** provides a summary of Project TAC emissions.

One application was permitted in the last five years, AN 643939, for an emergency diesel generator (S-1). TAC emission factors for the natural gas engine are based on the California Air Toxics Emission Factors (CATEF) database for Natural Gas Fired, Rich Burn < 650 HP Engines and Table 3.2-3 from AP-42 Chapter 3.2: Natural Gas-fired Reciprocating Engines. CATEF emission factors are preferentially chosen over AP-42 factors. For AP-42 emission factors based on a non-detect reading, the chosen emission factor was equal to 1/2 of the detection limit.

Table 2. Project TAC Review for S-3 & S-1

Compound	Emission Factor (lb/MMBtu)	Basis	Hourly Emission Rate (lb/hr)	Acute Trigger Level (lb/hr)	Annual Emission Rate (lb/yr)	Chronic Trigger Level (lb/yr)	Exceeds Acute or Chronic Trigger Level?
Proposed Emergency Standby NG Engine (S-3)							
1,1,2,2-Tetrachloroethane	2.53E-05	AP-42	4.77E-05	--	2.39E-03	1.40E+00	No
1,1,2-Trichloroethane	7.65E-06	AP-42	1.44E-05	--	7.22E-04	5.00E+00	No
1,1-Dichloroethane	5.65E-06	AP-42	1.07E-05	--	5.33E-04	5.00E+01	No
1,3-Butadiene	9.94E-05	CATEF	1.88E-04	2.90E-01	9.38E-03	4.80E-01	No
Acetaldehyde	8.41E-04	CATEF	1.59E-03	2.10E-01	7.93E-02	2.90E+01	No
Acrolein	5.21E-04	CATEF	9.83E-04	1.10E-03	4.92E-02	1.40E+01	No
Benzene	1.82E-03	CATEF	3.43E-03	1.20E-02	1.71E-01	2.90E+00	No
Carbon Tetrachloride	8.85E-06	AP-42	1.67E-05	8.40E-01	8.35E-04	1.90E+00	No
Chlorobenzene	6.45E-06	AP-42	1.22E-05	--	6.09E-04	3.90E+04	No
Chloroform	6.85E-06	AP-42	1.29E-05	6.60E-02	6.46E-04	1.50E+01	No
Ethylbenzene	1.11E-05	CATEF	2.09E-05	--	1.04E-03	3.30E+01	No
Ethylene Dibromide	1.07E-05	AP-42	2.01E-05	--	1.00E-03	1.10E+00	No
Formaldehyde	2.24E-03	CATEF	4.22E-03	2.40E-02	2.11E-01	1.40E+01	No
Methanol	3.06E-03	AP-42	5.77E-03	1.20E+01	2.89E-01	1.50E+05	No
Methylene Chloride	4.12E-05	AP-42	7.77E-05	6.20E+00	3.89E-03	8.20E+01	No
Naphthalene	7.29E-05	CATEF	1.38E-04	--	6.88E-03	2.40E+00	No
PAH	2.01E-07	CATEF	3.80E-07	--	1.90E-05	3.30E-03	No
Propylene	1.53E-02	CATEF	2.88E-02	--	1.44E+00	1.20E+05	No
Styrene	5.95E-06	AP-42	1.12E-05	9.30E+00	5.61E-04	3.50E+04	No
Toluene	1.02E-03	CATEF	1.92E-03	2.20E+00	9.60E-02	1.60E+04	No
Vinyl Chloride	3.59E-06	AP-42	6.77E-06	8.00E+01	3.39E-04	1.10E+00	No
Xylene (total)	6.26E-04	CATEF	1.18E-03	9.70E+00	5.91E-02	2.70E+04	No
Existing Emergency Diesel Generator (S-1)							

Compound	Emission Factor (lb/MMBtu)	Basis	Hourly Emission Rate (lb/hr)	Acute Trigger Level (lb/hr)	Annual Emission Rate (lb/yr)	Chronic Trigger Level (lb/yr)	Exceeds Acute or Chronic Trigger Level?
Diesel Particulate Matter	2.8E-01	EPA Certification	5.7E-02	--	2.9E+00	2.6E-01	Yes, Chronic

Basis:

- A 0% by weight abatement efficiency is used for toxics for S-3 because the engine is not equipped with any sort of control device.

The Project no longer qualifies for a streamlined Health Risk Assessment (HRA) as a diesel engine, S-1, is included in the Project. As such, the exceedance of a trigger level from S-1 necessitates that the project undergo a refined HRA in accordance with Regulation 2-5-302.

HRA Results

This analysis estimates the incremental health risk resulting from TAC emissions from non-emergency operation of the standby generator diesel engine and natural gas engine at this facility. Results from this HRA indicate that the maximum project cancer risk is estimated at 0.29 in a million, and the maximum project chronic hazard index is estimated at 0.000085. See HRA Report for more details.

Table 3. Health Risk Assessment Results

Maximally Exposed Receptor	Maximum Cancer Risk (chance in a million)	Maximum Chronic Hazard Index
Resident	0.29	0.000085
Off-site Worker	0.061	0.000050

Best Available Control Technology for Toxics (TBACT)

In accordance with the District’s Regulation 2-5-301, these sources does not require TBACT because the estimated project’s cancer risk is less than 1.0 in a million and/or the maximum chronic hazard index is less than 0.2.

Project Risk Limits

Since the proposed engines, operating at 50 hours/year for reliability related testing, have an estimated project cancer risk that does not exceed 10 in a million, and the chronic hazard index does not exceed 1.0, this project complies with the District’s Regulation 2-5-302 project risk requirements. No additional operating hour restrictions were necessary for this project.

Best Available Control Technology (BACT)

Pursuant to Regulation 2-2-301, Best Available Control Technology (BACT) shall apply to any new or modified source with the potential to emit (PTE) 10.0 pounds or more per day of the pollutants in **Table 1**.

BACT is not triggered for any pollutant since the maximum daily emissions of any pollutant do not exceed 10.0 pounds per day.

Plant Cumulative Emissions

Table 4 summarizes the cumulative increase in criteria pollutant emissions that will result from the operation of S-3.

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

Pollutant	Existing Emissions Post 4/5/91 (ton/yr) ¹	Application Emissions (ton/yr)	Cumulative Emissions (ton/yr)
NO _x	0.051	0.000	0.051
POC	0.002	0.001	0.003
CO	0.013	0.000	0.013
PM ₁₀ /PM _{2.5}	0.001	0.001	0.002
SO ₂	0.000	0.000	0.000

Notes:

¹Existing Emissions based on the last approved permit application, AN 643949.

Offsets

Per Regulation 2-2-302, offsets must be provided for any new or modified source at a facility that has the PTE more than 10 ton/yr of POC or NO_x. The PTE includes 50 hours allowed for testing and maintenance as well as an assumed 100 hours per year for emergencies.

Table 5. Potential to Emit for Facility #202362

Pollutant	Existing Facility Emissions (ton/yr) ¹	Application Emissions (ton/yr)	New Facility Emissions (ton/yr)	Offsets Requirement (ton/yr)	Offsets Required?
NO _x	0.154	0.001	0.155	10	No
POC	0.006	0.004	0.010	10	No
CO	0.040	0.001	0.041	100	No
PM ₁₀ /PM _{2.5}	0.004	0.003	0.007	100	No
SO ₂	0.000	0.000	0.000	--	--

Notes:

¹Existing Emissions based on the last approved permit application, AN 643949.

Based on the emission calculations in **Table 5**, offsets are not required for this application.

Statement of Compliance

The owner/operator of S-3 shall comply with Regulation 6, Rule 1 (*Particulate Matter and Visible Emissions Standards*) and Regulation 9-1-301 (*Inorganic Gaseous Pollutants: Sulfur Dioxide for Limitations on Ground Level Concentrations*). From Regulation 9-1-301, the ground level concentrations of SO₂ will not exceed 0.5 ppm continuously for 3 consecutive minutes, 0.25 ppm averaged over 60 consecutive minutes, or 0.05 ppm averaged over 24 hours.

S-3 is an emergency standby generator. Pursuant to Regulation 9, Rule 8 (*NO_x and CO from Stationary Internal Combustion Engines*), Section 110.5 (*Emergency Standby Engines*), S-3 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 recordkeeping in Regulation 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.

New Source Performance Standards (NSPS)

The NSPS in 40 CFR 60, Subpart JJJJ apply when the owners and operators of stationary Spark Ignition (SI) Internal Combustion Engines (ICE) commence construction after June 12, 2006, where the stationary SI ICE are manufactured on or after January 1, 2009, for emergency engines with a maximum engine power greater than 19 KW (25 HP) as per 40 CFR 60.4230(a)(4)(iv). This engine will be installed after June 12, 2006, would have been manufactured after January 1, 2009, and is greater than 25 HP. Therefore, the engine must comply with the following emission standards below. These standards pertain to emergency spark-ignited engines greater than 130 hp:

Pollutant	S-3 Emission Factor	NSPS Standard
NO _x	0.03 g/bhp-hr	2.00 g/bhp-hr
POC	0.1 g/bhp-hr	1.00 g/bhp-hr
CO	0.02 g/bhp-hr	4.00 g/bhp-hr

As shown above, S-3 is compliant with NSPS emission requirements.

National Emission Standards for Hazardous Air Pollutants (NESHAP)

This engine will operate at a hazardous air pollutant (HAP) area source. Therefore, the engine will be subject to the Reciprocating Internal Combustion Engine (RICE) 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-3 complies with the NESHAP by meeting the requirements under 40 CFR Part 60, Subpart JJJJ.

California Environmental Quality Act (CEQA)

This permit application is not subject to the California Environmental Quality Act (CEQA) because the Air District’s evaluation is a ministerial action (Public Resources Code Section 21080(b)(1) and CEQA Guidelines Section 15268(a)) conducted using the fixed standards and objective measurements in the Air District’s rules and regulations.

Public Notification (Regulation 2-1-412)

The project is not located within an Overburdened Community (OBC), as defined in Regulation 2-1-243. However, this equipment will be located within 1,000 feet of a kindergarten through grade 12 school site and emits TACs, therefore the project is subject to the public notification requirements of Regulation 2-1-412.

A public notice will be sent to all parents or guardians of students enrolled at the schools listed below within ¼ mile of the source and all businesses and residents within 1000’ of the proposed source.

Table 6. Schools Subject to Public Noticing for Application #712469

School Name	Street Address	City
Archbishop Riordan High School	175 Phelan Ave	San Francisco, CA 94112
Sunnyside Elementary School	250 Foerster St	San Francisco, CA 94112

All comments received shall be summarized in the final evaluation report.

Permit Conditions

Permit Condition #23107 for S-3

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 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/Permit to Operate for the equipment listed below. However, the proposed source will emit TACs within 1,000 feet of a kindergarten through grade 12 school site, which triggers the public notification requirements of District Regulation 2-1-412. After the comments are received and reviewed, the District will make a final determination on the permit.

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

S-3 Emergency Standby Natural Gas (NG) Engine
Make: Generac, Model: SG-130, Model Year: 2016
230.30 bhp, 1.89 MMBtu/hr

Prepared By: Kevin Creaven, Air Quality Engineer II

February 26, 2025

Attachment 1

Table 1 to Subpart JJJJ of Part 60—NO_x, CO, and VOC Emission Standards for Stationary Non-Emergency SI Engines ≥100 HP (Except Gasoline and Rich Burn LPG), Stationary SI Landfill/Digester Gas Engines, and

Engine type and fuel	Maximum engine power	Manufacture date	Emission standards ^a					
			g/HP-hr			ppmvd at 15% O ₂		
			NO _x	CO	VOC ^d	NO _x	CO	VOC ^d
Non-Emergency SI Natural Gas ^b and Non-Emergency SI Lean Burn LPG ^b	100≤HP<900	7/1/2008	2.0	4.0	1.0	160	540	86
		1/1/2011	1.0	2.0	0.7	82	270	40
Non-Emergency SI Lean Burn Natural Gas and LPG	500≤HP<1,350	1/1/2008	2.0	4.0	1.0	160	540	86
		7/1/2010	1.0	2.0	0.7	82	270	40
Non-Emergency SI Natural Gas and Non-Emergency SI Lean Burn LPG (except lean burn 500≤HP<1,350)	HP≤500	7/1/2007	2.0	4.0	1.0	160	540	86
		7/1/2010	1.0	2.0	0.7	82	270	40
Landfill/Digester Gas (except lean burn 500≤HP<1,350)	HP<500	7/1/2008	3.0	5.0	1.0	220	610	80
		1/1/2011	2.0	5.0	1.0	150	610	80
		7/1/2007	3.0	5.0	1.0	220	610	80
		7/1/2010	2.0	5.0	1.0	150	610	80
Landfill/Digester Gas Lean Burn	500≤HP<1,350	1/1/2008	3.0	5.0	1.0	220	610	80
		7/1/2010	2.0	5.0	1.0	150	610	80
Emergency	25+HP<130	1/1/2009	^c 10	367	N/A	N/A	N/A	N/A
		HP≥130		2.0	4.0	1.0	160	540

^a Owners and operators of stationary non-certified SI engines may choose to comply with the emission standards in units of either g/HP-hr or ppmvd at 15 percent O₂.

^b Owners and operators of new or reconstructed non-emergency lean burn SI stationary engines with a site rating of greater than or equal to 250 brake HP located at a major source that are meeting the requirements of 40 CFR part 63, subpart ZZZZ, Table 2a do not have to comply with the CO emission standards of Table 1 of this subpart.