Draft Engineering Evaluation Report
Application #29231
Making Waves Academy and Foundation, Plant #24138
Plant address: 4285 Lakeside Drive, Richmond, CA 94806

BACKGROUND

Making Waves Academy and Foundation has applied for an Authority to Construct and Permit to Operate for the following equipment to be located at 4285 Lakeside Drive in Richmond:

S-1, Emergency Standby Generator equipped with 3-Way Catalyst, Natural Gas-Fired Engine, Model: Generac SG035, EPA Certified Engine Family JGNXB05.42L1, Model Year 2018; 82 BHP

EMISSIONS SUMMARY

The proposed emergency standby, natural gas-fired IC engine (S-1) is an EPA-certified 2018 engine (EPA Certificate JGNXB05.42L1). The criteria pollutant emissions from the engine were calculated based on manufactured provided emission factors (EFs) for CO, HC, NOx. The emission factors for PM and SO_2 were from Chapter-3, Table 3.2-2 of the EPA Document AP-42, Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, dated 7/2000.

S-1 emission basis:

- 82 hp output rating
- Maximum Operation hours: 24 hours/day, 50 hours/year
- Fuel consumption = 682 ft^3/hr natural gas
- Heat capacity = 1,020 MMBtu/10^6 ft^3 natural gas
- Engine heat input = 682 ft^3/hr x (1020 MMBtu/10^6 ft^3) =0.70 MMBtu/hr

Table 1. Criteria Pollutant Emission Factors for S-1

Pollutant	EF	units
POC[a]	0.38	g/hp-hr
NOx[a]	0.22	g/hp-hr
CO[a]	0.64	g/hp-hr
SO_2	0.00059	lb/MMBtu
PM10	0.010	lb/MMBtu
PM2.5	0.010	lb/MMBtu

[a] Emission Factor from the Manufacturer.

Emissions from S-1 were calculated as follows:

$$POC\ \left(\frac{lb}{hr}\right) = 0.38\left(\frac{g}{hp-hr}\right)(82\ bhp)\left(\frac{1lb}{453.6\ g}\right) = 0.069\left(\frac{lb}{hr}\right)$$

$$NOx\ \left(\frac{lb}{hr}\right) = 0.22\left(\frac{g}{hp-hr}\right)(82\ bhp)\left(\frac{1lb}{453.6\ g}\right) = 0.040\left(\frac{lb}{hr}\right)$$

$$CO\ \left(\frac{lb}{hr}\right) = 0.64\left(\frac{g}{hp-hr}\right)(82\ bhp)\left(\frac{1lb}{453.6\ g}\right) = 0.12\left(\frac{lb}{hr}\right)$$

$$SO_2\left(\frac{lb}{hr}\right) = \left(0.00059\frac{lb}{MMBtu}\right)\left(\frac{0.7\ MMBtu}{hr}\right) = 0.0004\left(\frac{lb}{hr}\right)$$

$$PM10\ and\ PM2.5\left(\frac{lb}{hr}\right) = \left(0.010\frac{lb}{MMBtu}\right)\left(\frac{0.7\ MMBtu}{hr}\right) = 0.007\left(\frac{lb}{hr}\right)$$

The emission rates above were multiplied by the maximum allowable discretionary usage of 50 hours per year, as allowed under District Regulation 9, Rule 8, to calculate annual discretionary emissions. Worst case daily emissions have been based on continuous operation 24 hours per day. Maximum daily emission and maximum annual emissions were determined by the following calculations:

$$Emission\ (\frac{lb}{day}) = Emissions(\frac{lb}{hr})(\frac{24\ hr}{day})$$

$$Emission\ (\frac{Ton}{year}) = Emissions(\frac{lb}{hr})(\frac{50\ hr}{year})(\frac{1\ Ton}{2000\ lb})$$

Emission rates, maximum daily, and maximum annual emissions from S-1 are summarized in Table 2.

Table 2. Criteria Pollutant Emission Rates and Maximum Discretionary Emissions from S-1

Pollutant	Emission Rate, g/bhp-hr	Emission Rate, lbs/hr	Maximum Daily Operation, hours/day	Maximum Daily Emissions, pounds/day	Maximum Annual Operation, hours/year	Maximum Annual Emissions, pounds/year	Maximum Annual Emissions, tons/year
PM10	0.055	0.007	24	0.2	50	0.3	0.0002
PM2.5	0.055	0.007	24	0.2	50	0.3	0.0002
POC	0.38	0.07	24	1.7	50	3.4	0.0017
NOx	0.22	0.04	24	1.0	50	2.0	0.0010
SO2	0.003	0.0004	24	0.01	50	0.02	0.00001
CO	0.64	0.12	24	2.8	50	5.8	0.0029

Toxic Air Contaminant Emissions from Natural Gas Combustion:
The emission factors used to estimate toxic air contaminant (TAC) emissions from the engine are derived from the California Air Toxics Emission Factor Database (CATEF), which are maintained by the California Air Resources Board for natural gas fired 4-stroke rich burn engines with less than 650 hp or from EPA's AP-42 for natural gas fired 4-stroke rich burn engines, Table 3.2-3.

S-1 has a maximum firing rate of 0.7 MMBtu/hr and a maximum rating of 82 hp. In accordance with the District's Permit Handbook Chapter 2.3.2 for Stationary Natural Gas Engines, the CATEF Emission Factors were used to estimate emissions for all compounds that have both AP-42 emission factors and CATEF emission factors. The heat content of natural gas was assumed to be 1020 Btu/scf. As summarized in Table 3, no TACs will be emitted in levels exceeding the trigger levels in Regulation 2, Rule 5, Table 1.

Table 3. Toxic Air Contaminant Emissions from Discretionary Use of S-1

Toxic Air Contaminant	Abated Emission Factor (lb/MMBTU)	Hourly Emissions (lb/hr)	Acute Trigger Level (lb/hr)	Over Acute Trigger? (Yes/No)	Annual Emissions (lb/year)	Chronic Trigger (lb/year)	Over Chronic Trigger? (Yes/No)
1,1,2,2-Tetrachloroethane*	1.27E-05	8.80E-06	None	no	4.40E-04	1.4E+00	no
1,1,2-Trichloroethane*	7.65E-06	5.32E-06	None	no	2.66E-04	5.0E+00	no
1,1-Dichloroethane*	5.65E-06	3.93E-06	None	no	1.97E-04	5.0E+01	no
1,2-Dichloroethane*	5.65E-06	3.93E-06	None	no	1.97E-04	4.0E+00	no
1,3-Butadiene	5.10E-05	3.55E-05	1.5E+00	no	1.77E-03	4.8E-01	no
Acetaldehyde	4.33E-04	3.01E-04	1.0E+00	no	1.51E-02	2.9E+01	no
Acrolein	2.68E-04	1.87E-04	5.5E-03	no	9.33E-03	1.4E+01	no
Benzene	3.62E-05	2.52E-05	6.0E-02	no	1.26E-03	2.9E+00	no
Carbon Tetrachloride*	8.85E-06	6.16E-06	4.2E+00	no	3.08E-04	1.9E+00	no
Chlorobenzene*	6.45E-06	4.49E-06	None	no	2.24E-04	3.9E+04	no
Chloroform*	6.85E-06	4.77E-06	3.3E-01	no	2.38E-04	1.5E+01	no
Ethylbenzene	5.69E-06	3.96E-06	None	no	1.98E-04	3.3E+01	no
Ethylene Dibromide*	1.07E-05	7.41E-06	None	no	3.70E-04	1.1E+00	no
Formaldehyde	2.45E-05	1.70E-05	1.2E-01	no	8.51E-04	1.4E+01	no
Methanol*	1.53E-03	1.06E-03	6.2E+01	no	5.32E-02	1.5E+05	no
Methylene Chloride*	2.06E-05	1.43E-05	3.1E+01	no	7.17E-04	8.2E+01	no
Naphthalene	3.75E-05	2.61E-05	None	no	1.30E-03	2.4E+00	no
PAH or derivative, TOTAL	1.81E-09	1.26E-09	None	no	6.28E-08	3.3E-03	no
Propylene	7.84E-03	5.46E-03	None	no	2.73E-01	1.2E+05	no
Styrene*	5.95E-06	4.14E-06	4.6E+01	no	2.07E-04	3.5E+04	no
Toluene	5.25E-04	3.65E-04	8.2E+01	no	1.82E-02	1.2E+04	no
Vinyl Chloride*	3.59E-06	2.50E-06	4.0E+02	no	1.25E-04	1.1E+00	no
Xylenes	2.95E-05	2.05E-05	4.9E+01	no	1.03E-03	2.7E+04	no

* AP-42 factors when CATEF factors are not available

Cumulative Emission Increase

Table 4 summarizes the cumulative increase in criteria pollutant emissions for the facility, resulting from this project.

Table 4. Plant#21438 Cumulative Emission Increase

Pollutant	Existing (ton/yr)	New (ton/yr)	New Total
PM10	0	0.0002	0.0002
PM2.5	0	0.0002	0.0002
POC	0	0.0017	0.0017
NOx	0	0.0010	0.0010
SO_2	0	0.00001	0.00001
CO	0	0.0029	0.0029

COMPLIANCE DETERMINATION

Regulation 1: General Provisions and Definitions

The facility is subject to Regulation 1, Section 301, which prohibits discharge of air contaminants resulting in public nuisance. The facility is expected to comply with this requirement.

Regulation 2, Rule 1: Permits – General Requirements

California Environmental Quality Act (CEQA): District Regulation 2, Rule 1, Section 310 specifies that all proposed new and modified sources subject to District permit requirements must be reviewed in accordance with CEQA requirements, except for ministerial projects or projects exempt from CEQA under Section 2-1-312. The engineering review for this project requires only the application of standard permit conditions and standard emission factors in accordance with Permit Handbook Chapter 2.3.2, Combustion Equipment – Internal Combustion Engines, Stationary Natural Gas Engines. Therefore, this application is considered to be ministerial and is exempt from CEQA review.

Public Notification: The public notification requirements of Regulation 2-1-412 apply to applications which result in any increase in toxic air contaminant or hazardous air contaminant emissions at facilities within 1,000 feet of the boundary of a K-12 school. S-1 will be located on the roof of a K-12 school. Therefore, the public notice requirements in Regulation 2-1-412 will apply.

Regulation 2, Rule 2: Permits – New Source Review

Best Available Control Technology (BACT): Regulation 2, Rule 2, Section 301 states that BACT requirements are triggered if maximum potential emissions from a new or modified source will be 10 pounds/day or more of NOX, CO, POC, NPOC, PM10, PM2.5, or SO2. As shown in Table 2, the emissions from S-1 will not exceed 10 pounds/day. Therefore, BACT is not triggered.

Emission Offsets: Under Section 2-2-302, POC and NOx emission offsets are required for new or modified sources at a facility which emits or will be permitted to emit 10 tons per year or more on a pollutant specific basis. Since the facility does not have the potential to emit more than 10 tons per year of NOx or POC emissions, the facility is not subject to NO_x or POC offset requirements. Since the facility will not have the potential to emit more than 100 tons per year of any criteria pollutant, the facility

is not a "Major Facility" as defined in Regulation 2-1-203 and is also not subject to PM_{10} or SO_2 offsets under Regulation 2-2-303.

PSD Review

Since the facility will not have the potential to emit more than 100 tons per year of any criteria pollutant, the facility is not a "Major Facility" as defined in Regulation 2-1-203, and is not subject to PSD permitting requirements under Regulation 2-2-304.

Regulation 2, Rule 5: Permits – New Source Review of Toxic Air Contaminants

Health Risk Analysis: The District's regulation concerning toxic air contaminant emissions is codified in Regulation 2, Rule 5, New Source Review of Toxic Air Contaminants (TAC). The TAC emissions from new and modified sources are subject to risk assessment review, if the emissions of any individual TAC exceed either the acute or chronic emission thresholds defined in Table 2-5-1. As shown in Table 3, the proposed emissions from the operation of S-1 do not exceed any chronic or acute trigger levels, therefore no health risk analysis is required for this application.

Regulation 6, Rule 1: Particulate Matter – General Requirements

Like all combustion sources, this natural gas-fired IC engine is subject to Regulation 6, Rule 1. Since the engine displacement is 330 cubic inches (less than 1500 cubic inches), Section 6-1-303 applies instead of 6-1-301. Section 6-1-303 limits visible emissions to not exceed Ringelmann 2.0 for periods aggregating more than 3 minutes in any hour or equivalent opacity. Section 6-1-305 prohibits public nuisance caused by fallout of visible particulate emissions. Properly operating natural gas-fired internal combustion engines are not expected to produce visible emissions or fallout in violation of these sections.

Section 6-1-310 limits particulate emissions to 0.15 grains/dscf of exhaust gas volume. The particulate emission rate from this engine is 0.0095 lbs/MMBtu, which result in an outlet grain loading of 0.0156 grains per dscf at 0% O_2. This emission rate is less than the limit in Section 6-1-310, so compliance with this section is ensured.

Regulation 8, Rule 1: Organic Compounds – General Provisions

All internal combustion engines are exempt from Regulation 8 per Section 8-1-110.2, therefore none of the rules in Regulation 8 apply to this engine.

Regulation 9, Rule 1: Inorganic Gaseous Pollutants – Sulfur Dioxide

The engine is subject to and will comply with Regulation 9, Rule 1, "Inorganic Gaseous Pollutants, Sulfur Dioxide" since fuel is restricted to natural gas only. Based on the following calculation, combustion of natural gas is expected to produce a SO_2 concentration of less than 1 ppmv, thereby meeting the maximum outlet concentration of 300 ppmv SO_2 limit in Regulation 9, Rule 1, Section 302.

SO_2 ppmv = (0.000588 lb/MMBtu)* (385.5 ft^3 SO_2/lb mol SO_2)/(1 ft^3 $SO_2/10^6$ $sdft^3$ flue)/[(20.9-0)/(20.9-15)]/(64.0588 lb SO_2/lb mol SO_2)/(8710 $sdft^3$ flue/MMBtu) = 0.11 ppmv at 15% O_2

Regulation 9, Rule 8: Inorganic Gaseous Pollutants – Nitrogen Oxides and Carbon Monoxide from Stationary Internal Combustion Engines

Regulation 9, Rule 8 applies to stationary internal combustion engines with a rated output greater than 50 bhp. S-1 has a rated capacity of 82 bhp and is subject to this rule. However, Section 9-8-110.5 exempts emergency standby engines from Sections 301 through 305, 501, and 503 of this rule. Since S-1 will be used as an emergency standby engine, those sections do not apply, however the limitation to 50 hours of reliability-related operation in any calendar year specified in Section 9-8-330 will apply. Operation

during emergencies is not limited. In addition, the monitoring and recordkeeping requirements in Section 9-8-530 apply and will be included in the permit conditions for this source.

Federal Requirements

New Source Performance Standards (NSPS): S-1 is subject to 40 CFR Part 60 Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines per §60.4230(a)(4)(iv) since construction commenced after June 12, 2006, it was manufactured on or after January 1, 2009, and is an emergency engine with a maximum engine power greater than 25 HP. Per §60.4233(d), the owner/operators must meet the emission standards in Table 1 to Subpart JJJJ of Part 60, which are: NO_x 10 g/bhp-hr and CO 387 g/bhp-hr. The engine family for S-1 has been certified to comply with these emission standards under EPA Family Name JGNXB05.42L1. Per §60.4245(a), the owner/operator must keep records of all notifications submitted, maintenance conducted, and documentation from the manufacturer that the engine is certified to meet the emission standards.

National Emission Standards for Hazardous Air Pollutants (NESHAPs): S-1 is subject 40 CFR Part 63 Subpart ZZZZ National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines. Per §63.6590(c)(1), this engine complies with this subpart because it is located at an area source and meets the requirement of 40 CFR Part 60 Subpart JJJJ.

Permit Conditions

Condition #23107 includes the operating and recordkeeping requirements for operation of source S-1 and shall be made a part of the Authority to Construct/Permit to Operate:

1. The owner or operator shall operate the stationary emergency standby engine only to mitigate emergency conditions or for reliability-related activities (maintenance and testing). Operating while mitigating emergency conditions and while emission testing to show compliance with this part is unlimited. Operating for reliability-related activities are limited to 50 hours per year. (Basis: Emergency Standby Engines, Hours of Operation Regulation 9-8-330)

2. The Owner/Operator shall equip the emergency standby engine(s) with: a non-resettable totalizing meter that measures hours of operation or fuel usage. (Basis: Emergency Standby Engines, Monitoring and Recordkeeping Regulation 9-8-530)

3. 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. 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 (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: Emergency Standby Engines, Monitoring and Recordkeeping Regulation 9-8-530)

RECOMMENDATION

The District has reviewed the material contained in the permit application for this 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, subject to Condition #23107. However, the proposed source will be located within 1000 feet of a school, 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 for the following source:

S-1, Emergency Standby Generator equipped with 3-Way Catalyst, Natural Gas-Fired Engine, Model: Generac SG035, EPA Certified Engine Family JGNXB05.42L1, Model Year 2018; 82 BHP

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Tamiko Endow Date
Senior Air Quality Engineer