

ENGINEERING EVALUATION

Sleepy Hollow Elementary School
Plant 203064 | Application 677074
20 Washington Lane, Orinda, CA 94563

BACKGROUND

Sleepy Hollow Elementary School has applied to obtain an Authority to Construct and a Permit to Operate for the following equipment:

- S-1 Emergency Standby Diesel Generator**
Engine Manufacturer: Cummins, Model: QSB5-G6, Model Year: 2023
Engine Family: PCEXL0275AAK
208 BHP (125 kW), 1.41 MMBTU/hr
Displacement: 4.46 L (272 cu. in.)
4 In-line Cylinders
Permit Condition Nos. 100072 and 100073

The proposed S-1 emergency standby diesel generator set will be located at an elementary school located in Orinda, CA. S-1 will help provide service to the school in emergency situations. S-1 is a Tier-3 engine generator set.

EMISSIONS

Criteria Pollutants

The criteria pollutants are nitrogen oxides (NO_x), carbon monoxide (CO), precursor organic compounds (POC), sulfur dioxide (SO₂), particulate matter (PM₁₀ and PM_{2.5}). POC is also denoted as NMHC. Except for SO₂, the emission factors for these engines are EPA-certified (EPA Certificate PCEXL0275AAK-025). The SO₂ emissions were calculated based on the maximum allowable sulfur content (0.0015 wt%) of the diesel fuel with assumption that the entire sulfur content will be converted to SO₂ during the combustion process. S-1 will be limited to 50 hours for maintenance-related activity.

Table 1. Estimated Abated Emissions at S-1

Pollutant	Emission Factor (g/bhp-hr)	Maximum Daily Rate (lbs/day)	Annual Emissions (lbs/year)	Annual Emissions (tons/year)
NO _x	2.68	29.46	61.38	0.031
POC	0.17	1.89	3.93	0.002
CO	0.75	8.21	17.10	0.009
PM _{10, 2.5} / diesel particulate ¹	0.11	1.23	2.57	0.001
	lb SO ₂ /bhp-hr			
SO ₂ ²	1.5E-03	1.67E-02	3.50E-02	0.000

Basis:

- Annual emissions: Reliability-related activity 50 hours for S-1, per Regulation 9-8-330 (Emergency Standby Engines, Hours of Operation)
- Max daily emissions: 24-hour operation
- Emissions from EPA Engine Family PCEXL0275AAK
- ¹ Conservative assumption that all PM₁₀ emissions are PM_{2.5}
- ² SO₂ emission factor from AP-42 Table 3.4-1, SO₂ (15 ppm) = 0.00809*0.0015 lb SO₂/bhp-hr

Plant Cumulative Increase

Table 2 summarizes the cumulative increase in criteria pollutant emissions that will result from the operation of S-1 and is based on 50 hours of maintenance-related activity. Sleepy Hollow Elementary School doesn't have any pre-4/5/1991 emissions.

Table 2. Plant Cumulative Increase

Pollutant	Current Emissions (since April 5, 1991) (tons/year)	Increase with this application (S-1) (tons/year)	Cumulative Emissions (Current + Increase) (tons/year)
NO _x	0.000	0.031	0.031
POC	0.000	0.002	0.002
CO	0.000	0.009	0.009
PM ₁₀ / diesel particulate	0.000	0.001	0.001
PM _{2.5}	0.000	0.001	0.001
SO ₂	0.000	0.000	0.000

Toxic Air Contaminants

Table 3. Toxic Air Contaminants – Risk Screen Triggers

Pollutant	Emission Rate (lb/yr)	Risk Screening Trigger (lb/yr)
PM ₁₀ (Diesel Particulate)	2.57	10.00

Offsets

Offsets 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 NO_x or POC, as specified in Regulation 2-2-302; 100 tons per year or more of PM_{2.5}, PM₁₀ or SO₂, as specified in Regulation 2-2- 303.

NO_x: 0.092 TPY (this application)

POC: 0.006 TPY (this application)

This project does not exceed the PTE thresholds requiring offsets.

STATEMENT OF COMPLIANCE

California Environmental Quality Review (CEQA)

This application is considered to be ministerial under the District's Regulation 2-1-311 (Permit Handbook Chapter 2.3.1 Stationary Diesel Engines) and is considered an emergency project (per CEQA Guidelines Section 15269). This project is therefore not subject to CEQA review.

Public Notification, Schools

Public Notice is required pursuant to Regulation 2-1-412 since the nearest public school is located within 1,000 ft. of this source. Additionally, this facility is not located inside a designated overburdened community.

Best Available Control Technology (BACT)

Per Regulation 2-2-301, BACT is triggered for any new or modified source with the potential to emit 10 pounds or more per highest day of POC, NPOC, NO_x, CO, SO₂, PM₁₀, or PM_{2.5}. For this source, BACT is triggered since the maximum daily NO_x and emissions exceed 10 lb/day.

BACT for this source is presented in the current BAAQMD BACT/TBACT Workbook for IC Engine – Compression Ignition: Stationary Emergency, non-Agricultural, non-direct drive fire pump > 50 BHP and < 1000 BHP Output, Document #96.1.3 dated 12/22/2020. For NO_x, CO, POC and PM₁₀, BACT(2) is the CARB ATCM standard for the respective pollutant at the applicable horsepower rating. The

more restrictive BACT(1) standards are not applicable to this engine because it will be limited to operation as an emergency standby engine.

S-1 satisfies the current BACT(2) standards for the following pollutants with the potential to emit more than 10 lbs/day.

Table 4. BACT(2) Standards

Pollutant	S-1 Emission Factor (g/bhp-hr)	BACT(2) Standard (g/bhp-hr)
NO _x	2.68	2.85

* The standard is expressed as 3.0 g/bhp-hr of NMHC+NO_x. NO_x is estimated to be 95% of the combined standard (3.0*0.95 = 2.85 g/bhp-hr)

Prevention of Significant Deterioration (PSD)

This application is not part of a PSD project as defined in Regulation 2-2-304.

Health Risk Assessment (HRA)

New or modified sources of toxic air contaminants (TAC) requiring an authority construct or permit to operate pursuant to Regulation 2-1 are subject to review to evaluate potential public exposure and health risk, mitigate potentially significant health risks resulting from these exposures, and to provide net health risk benefits by improving the level of control when existing sources are modified or replaced.

Per the Air District’s Diesel Engine HRA Streamlining Policy (effective 07/01/2022), the threshold for project diesel particulate matter emissions is based on distance to nearest receptor and whether the project is located within an overburdened community. The threshold for this project is 10 lb/year, according to Table 1 of the policy. As determined using the District’s HRSA Streamlining Policy Checklist for Stationary Emergency Standby and Fire Pump Diesel Engines, this application qualifies for HRA Streamlining. Based on this policy, the District has determined that this project will comply with District TBACT requirements and will result in health impacts of less than 10 in a million cancer risk and less than 1.0 chronic hazard index based on conservative HRSA screening procedures. Additionally, this project is not located in a designated overburdened community. Therefore, this project will comply with Regulation 2, Rule 5, Section 301 and 302. A refined HRSA is not required for this application.

Particulate Matter – Regulation 6, Rule 1

Regulation 6-1-303 states that a person shall not emit for a period or periods aggregating more than three minutes in any hour, a visible emission that is as dark or darker than No. 2 on the Ringelmann Chart, or of such opacity as to obscure an observer’s view to an equivalent or greater degree, nor shall said emission, as perceived by an opacity sensing device in good working order, where such device is required by District Regulations, be equal to or greater than 40% opacity. S-1 is expected to comply with Regulation 6-1-303.

Limitations on Ground Level Concentrations of Sulfur Dioxide – Regulation 9, Rule 1

From Regulation 9-1-301, the ground level concentrations of SO₂ 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. Per Regulation 9-1-302, a person shall not emit from any source a gas stream containing sulfur dioxide in excess of 300 ppm (dry). And Regulation 9-1-304, states that a person shall not burn any liquid fuel having sulfur content in excess of 0.5% by weight. S-1 is expected to comply with Regulation 9, Rule 1 since diesel fuel sulfur content will not exceed 0.0015% by weight as mandated for use in California.

NO_x and CO from Stationary Internal Combustion Engines – Regulation 9, Rule 8

S-1 is exempt from the requirements of Regulations 9-8-301 through 305, 501 and 503 as per Regulation 9-8-110.5. S-1 is subject to the monitoring and record keeping procedures described in Regulations 9-8-502 (*Recordkeeping*) and 9-8-530 (*Emergency Standby Engines, Monitoring and Recordkeeping*). The requirements of this Regulation are included in the permit conditions. S-1 is also subject to and expected to comply with Regulation 9-8-330 (*Emergency Standby Engines, Hours of Operation*) since non-emergency hours of operation will be limited in the permit conditions to 50 hours per year.

New Source Performance Standards (NSPS)

40 CFR 60, Subpart IIII (NSPS IIII), Standards of Performance for Stationary Compression Ignition Internal Combustion Engines applies to non-fire pump engines such as S-1 that were manufactured after April 1, 2006. S-1 engine has a total displacement of 4.5 liters and has 4 cylinders. Therefore, each cylinder has a volume of less than 10 liters. The source is a 2023 model year engine and is not a fire pump. §60.4205(b) requires these engines to comply with the emission standards in §60.4202. Per §60.4202(a)(2), S-1 is subject to the emissions standards in 40 CFR Appendix I to Part 1039 (b) and 40 CFR 1039.105 (b) for all pollutants. Emission standards found in Table 2 of 40 CFR Appendix I to Part 1039 (b) for that apply to S-1 are: NMHC + NO_x = 3.0 g/bhp-hr; CO = 2.6 g/bhp-hr; and PM = 0.15 g/bhp-hr. It can be seen from Table 1 that S-1 complies with the emission standards in NSPS IIII.

40 CFR 1039.105 (b) sets forth the following smoke emission standards for non-road CI engines:

- 20% during the acceleration mode;
- 15% during the lugging mode; and
- 50% during the peaks in either the acceleration or lugging modes.

The opacity standards in 40 CFR 1039.105 (b), it appears, apply to mobile (and not stationary) non-road CI engines. Therefore, S-1 is not subject to the above standards. Instead, S-1 is subject to the opacity standards in Regulation 6, Rule 1, which is discussed in the later sections of this report.

Per §60.4207(b), S-1 is subject to the following diesel fuel requirements in 40 CFR 1090.305

- Sulfur content ≤ 15 ppm maximum
- Cetane index = 40 or maximum aromatic content of 35% by volume

National Emissions Standards for Hazardous Air Pollutants (NESHAP)

S-1 is subject to 40 CFR 63, Subpart ZZZZ (MACT ZZZZ), National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines because the engine is constructed (~installed) after June 12, 2006. Per §63.6590(c), “new” sources such as S-1 are required to meet the requirements in MACT ZZZZ by meeting the requirements in NSPS IIII. As previously discussed, S-1 complies with NSPS IIII and therefore, complies with MACT ZZZZ as well.

California Air Resources Board (CARB) Airborne Toxic Control Measure (ATCM) for Stationary Diesel Engines

The May 19, 2011, amendments to the CARB’s Airborne Toxic Control Measure (ATCM) harmonized the emission standards and certification requirements for new emergency stationary diesel engines greater than 50 BHP with the federal New Source Performance Standards for Stationary CI Internal Combustion Engines contained in 40 CFR § 60.4202. S-1 is an EPA-certified stationary diesel generator. Table 5 below compares S-1’s EPA certified emission rates to the applicable emission standards contained in Table 2 of the ATCM for 2010+ model year engines. S-1 is shown to comply with the applicable emissions standards in CARB’s ATCM.

Table 5. Comparison of EPA-Certified and CARB ATCM Emission Rates 175≤bhp<300

Pollutant	S-1 EPA certified emission rates (g/bhp-hr)	CARB ATCM emission rates (g/bhp-hr)
NMHC + NOx	0.17 + 2.68	3.00
CO	0.75	2.60
PM	0.11	0.15

CONDITIONS

Condition #100072 -----

1. The owner or operator shall operate each 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: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

2. The owner/operator shall operate each emergency standby engine 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: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

3. Records: The owner/operator shall maintain the following monthly records in a District-approved log for at least 36 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 to show compliance with emission limits.
 - c. Hours of operation (emergency).
 - d. For each emergency, the nature of the emergency condition.
 - e. Fuel usage for each engine(s).
 [Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

4. At School and Near-School Operation: If the emergency standby engine is located on school grounds or within 500 feet of any school grounds, the following requirements shall apply: The owner or operator shall not operate each stationary emergency standby diesel-fueled engine for non-emergency use, including maintenance and testing, during the following periods:
 - a. Whenever there is a school sponsored activity (if the engine is located on school grounds)
 - b. Between 7:30 a.m. and 3:30 p.m. on days when school is in session.
 “School” or “School Grounds” means any public or private school used for the purposes of the education of more than 12 children in kindergarten or any of grades 1 to 12, inclusive, but does not include any private school in which education is primarily conducted in a private home(s). “School” or “School Grounds” includes any building or structure, playground, athletic field, or other areas of school property but does not include unimproved school property.
[Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

Condition #100073 -----

- 1. The owner/operator shall not exceed the following limits per year per engine for reliability-related activities:

50 Hours of Diesel fuel (Diesel fuel)

[Basis: Cumulative Increase; Regulation 2-5; Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

RECOMMENDATION

I recommend that the District issue an Authority to Construct to Sleepy Hollow Elementary School for the following source:

- S-1 Emergency Standby Diesel Generator**
Engine Manufacturer: Cummins, Model: QSB5-G6, Model Year: 2023
Engine Family: PCEXL0275AAK
208 BHP (125 kW), 1.41 MMBTU/hr
Displacement: 4.46 L (272 cu. in.)
4 In-line Cylinders
Permit Condition Nos. 100072 and 100073

Christopher Ablaza
Air Quality Engineer
Engineering Division

Date