

DRAFT ENGINEERING EVALUATION

Facility ID No. 24776
Redwoods Retirement Community
40 Camino Alto, Mill Valley, CA 94941
Application No. 30697

BACKGROUND

The Redwoods Retirement Community has applied for an Authority to Construct/Permit to Operate for the following equipment:

S-1 Emergency Standby Diesel Generator Set
Make: Cummins, Inc., Model: QSX15-G9, Model Year: 2019
755 bhp, 4.71 MMBtu/hour
Permit Condition No. 22850 and 27343

Abated by

A-1 Diesel Particulate Filter
Make: Johnson Matthey Inc.,
SDPF CRT® Particulate Filter System consisting of a diesel oxidation catalyst and diesel particulate filter (Part Number: JM-SDPF-3-N-TITO-CS-10-LP DPF)

S-1 meets the Environmental Protection Agency (USEPA) Tier 2 Off-road standard. The engine will burn commercially available California low sulfur diesel fuel. The sulfur content of the diesel fuel will not exceed 0.0015% by weight.

EMISSIONS

Table 1. Annual and Daily Emissions for S-1 from EPA Certified Data

Pollutant	Emission Factor		Max Daily Emissions	Annual Emissions	Annual Emissions
	(grams/kW-hour) ⁽¹⁾	(grams/bhp-hour)	(pounds/day)	(pounds/year)	(tons/year)
NMHC +NO _x ⁽²⁾	5.7	4.10			
NO _x		4.04	161.3	336.1	0.168
POC		0.21	8.5	17.7	0.009
CO	0.6	0.45	17.9	37.2	0.019
PM ₁₀	0.13	0.10	3.9	8.1	0.004
PM _{2.5}		0.09 ⁽³⁾	3.8	7.9	0.004
SO ₂		N/A ⁽⁴⁾	0.2	0.4	0.000

Basis:

- Annual emissions: Reliability-related activity of 50 hours in accordance with the District's Policy for Calculating Potential to Emit of Emergency Generators

- Maximum daily emissions: 24-hour operation
- ¹Emission factors provided by EPA certified data for engine family KCEXL015.AAJ
- ²When the non-methane hydrocarbon (NMHC) and nitrogen oxide (NOx) emission factor is combined, assume a breakdown of 5% and 95%, respectively per “Policy: CARB Emission Factors for CI Diesel Engines – Percent HC in Relation to NMHC + NOx” dated June 28, 2004.
- ³PM_{2.5} emissions calculated by assuming that PM_{2.5} comprises 97.6 percent of PM₁₀ as stated in the South Coast Air Quality Management District (SCAQMD) document “Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds.”
- ⁴SO₂ emission factor calculated based on the following:
 - Complete conversion of sulfur in fuel to SO₂ and a maximum sulfur content of 15 ppm.
 - Density of Ultra Low Sulfur Diesel Fuel = 7.31 pounds/gallon
 - Fuel Consumption Rate = 34.4 gallons/hour
 - M(SO₂)=64.066 grams/mol, M(S)=32.065 grams/mol
 - $E_{SO_2} = \left(\frac{15 \text{ lb S}}{10E+06 \text{ lb fuel}} \right) \left(7.31 \frac{\text{lb fuel}}{\text{gal fuel}} \right) \left(34.4 \frac{\text{gal fuel}}{\text{hr fuel}} \right) \left(\frac{64.066 \text{ g/mol}}{32.065 \text{ g/mol}} \right) \left(50 \frac{\text{hr fuel}}{\text{yr}} \right)$
 $E_{SO_2} = 0.4 \text{ pounds/year}; 0.2 \text{ pounds/day}; 0.000 \text{ tons/year}$

CUMULATIVE INCREASE

In accordance with the District’s Policy for Calculating Potential to Emit of Emergency Generators, Table 2 summarizes the cumulative increase in criteria pollutant emissions that will result from this application assuming S-1 will operate for 50 hours/year for reliability related testing.

Table 2. Cumulative Emissions Increase, Post 4/5/91

Pollutant	Existing Emissions Post 4/5/91 (tons/year)	S-1 Emissions (tons/year)	Cumulative Emissions (tons/year)
NOx	0.000	0.168	0.168
POC	0.000	0.009	0.009
CO	0.000	0.019	0.019
PM ₁₀	0.000	0.004	0.004
PM _{2.5}	0.000	0.004	0.004
SO ₂	0.000	0.000	0.000

HEALTH RISK ASSESSMENT (HRA)

In accordance with the District’s Policy for Calculating Potential to Emit for Emergency Generators, an HRA was required because diesel exhaust particulate matter emissions from S 1, estimated at 8.1 pounds/year, assuming the engine operates for 50 hours/year for reliability related testing is greater than the Regulation 2, Rule 5 chronic toxic trigger level of 0.26 pounds/year.

S-1 is subject to the District's HRA streamlining policy for stationary diesel-fueled combustion engines used for backup power or fire pumps. The included HRA streamlining policy checklist shows that a refined HRA is not required for this permit application. The project is presumed to be in compliance with project risk requirements as recommended, limiting reliability-related activity hours by permit condition.

BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

Per Regulation 2-2-301, an Authority to Construct and/or Permit to Operate for a new source shall require BACT to control emissions of a District BACT pollutant as defined in Regulation 2-2-210 if the source will have the potential to emit that pollutant in an amount of 10.0 or more pounds on any day, as defined in Regulation 2-2-301.1. Per Table 1, BACT is triggered for NOx and CO.

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, Document #96.1.3, Revision 7. dated 12/22/2010. For NOx, CO, POC and PM10, BACT(2) is the CARB ATCM standard for the respective pollutant at the applicable horsepower rating. For SO₂, BACT(2) is using fuel with sulfur content not to exceed 0.0015%, or 15 ppm. 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 which exceed 10 pounds/day in Table 1 for engines > 750 HP as shown below::

Pollutant	S-1's Emission Factor	BACT(2) Standard
NOx	4.04 grams/bhp-hour	4.56 grams/bhp-hour
CO	0.45 grams/bhp-hour	2.6 grams/bhp-hour

OFFSETS

In accordance with the District's Policy for Calculating Potential to Emit (PTE) of Emergency Generators, the Potential to Emit for S-1 was estimated assuming 150 hours of operation/year as shown in Table 3.

Table 3. Offsets

Pollutant	Facility PTE Pre-Application (tons/year)	S-1 Emissions (tons/year)	Facility PTE Post-Application (tons/year)	Offset Triggers (tons/year)	Exceeds Offset Trigger?
NOx	0.000	0.504	0.504	> 10	No
POC	0.000	0.027	0.027	> 10	No
CO	0.000	0.056	0.056	NA	NA
PM ₁₀	0.000	0.012	0.012	> 100	No
PM _{2.5}	0.000	0.012	0.012	> 100	No
SO ₂	0.000	0.001	0.001	> 100	No

It can be seen from Table 3 that the facility's PTE after S-1 is permitted is below the Regulation 2-2 offset trigger levels. Therefore, offsets are not required.

STATEMENT OF COMPLIANCE

The owner/operator is expected to comply with all applicable requirements. Key requirements are listed below:

District Rules

Regulation 6-1 (Particulate Matter – General Requirements)

S-1 is subject to Regulation 6, Rule 1. Opacity and visible emissions from S-1 are limited by Regulations 6-1-303.1 (internal combustion engines of less than 25 liters (1500 in³) displacement) and 6-1-303.2 (engine used solely as a standby source of motive power) to Ringelmann 2. S-1 has a displacement of 14.9 liters (912 in³).

Regulation 6-1-305 prohibits emission of particles from any operation in sufficient number to cause annoyance to any other person where the particles are large enough to be visible as individual particles at the emission point, or of such size and nature as to be visible individually as incandescent particles. S-1 is not expected to produce visible emissions or fallout in violation of this regulation and will be assumed to be in compliance with Regulation 6-1-305.

S-1's compliance with Regulation 6, Rule 1 will be confirmed by the District's Compliance & Enforcement staff during their routine inspections.

Regulation 9-1-301 (Limitations on Ground Level Concentrations)

S-1 is subject to and is expected to comply with the applicable SO₂ limitations in Regulation 9, Rule 1 ("Inorganic Gaseous Pollutants – Sulfur Dioxide"). Because SO₂ emissions from S-1 are negligible, it is unlikely the APCO will require the Redwoods Retirement Community to conduct ground level monitoring.

Regulation 9-8 (Nitrogen Oxides and Carbon Monoxide from Stationary Internal Combustion Engines)

S-1 will be operated as an emergency standby engine and is therefore not subject to the emission rate limits in Regulation 9, Rule 8 ("Inorganic Gaseous Pollutants – NO_x and CO from Stationary Internal Combustion Engines"). S-1 is exempt from the requirements of Sections 9-8-301 through 305, 501, and 503 per Reg. 9-8-110.5 (Emergency Standby Engines). S-1 is subject to and is expected to comply with 9-8-330.3 (Emergency Standby Engines, Hours of Operation) since non-emergency hours of operation will be limited in the permit conditions to 50 hours per year. S-1 is also subject to and is expected to comply with monitoring and record keeping requirements of Regulations 9-8-502.1 and 9-8-530, which are incorporated into the proposed permit conditions.

California Environmental Quality Act (CEQA)

This project is ministerial under the District Regulation 2-1-311 (Permit Handbook Chapter 2.3.1) and is therefore not subject to CEQA review.

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. Per §60.4205(b), S-1 is subject to the emissions standards in 40 CFR 89.112 and 40 CFR 89.113 for all pollutants.

Emission standards found in Table 1 of 40 CFR 89.112 (a) that apply to S-1 are: NMHC + NO_x = 6.4 grams/kW-hour (4.77 grams/bhp-hour); CO = 3.5 grams/kW-hour (2.61 grams/bhp-hour); and PM = 0.20 grams/kW-hour (0.15 grams/bhp-hour).

It can be seen from Table 1 in this evaluation report that S-1 complies with the emission standards in NSPS IIII.

40 CFR 89.113 (a) 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 89.113, 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 was discussed above.

Per §60.4207(b), S-1 is subject to the following diesel fuel requirements in 40 CFR 80.510(c):

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

Diesel fuel sold in California meets the above standards. Therefore, S-1 complies with the diesel fuel requirements in NSPS IIII.

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 will be constructed (~installed) on/after June 12, 2006. Per §63.6590(c)(1), "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, will comply with MACT ZZZZ as well.

Prevention of Significant Deterioration (PSD)

PSD does not apply to this application.

SCHOOL NOTIFICATION (REGULATION 2-1-412)

S-1 is located within 1,000 feet of the outer boundary of K-12 school sites, Tamalpais High School and Mill Valley Middle School. Therefore, S 1 is subject to the public notification requirements of Regulation 2-1-412.

PERMIT CONDITIONS

Permit Condition #22850 for S-1

1. The owner/operator shall not exceed 50 hours per year per engine for reliability-related testing.

[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 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]

3. 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]

4. 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]

5. 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/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, 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]

Permit Condition #27343 for S-1

1. The owner/operator shall abate diesel exhaust particulate matter, carbon monoxide, and hydrocarbon emissions from the emergency diesel engine (S-1) with A-1 - a properly installed, operating, and maintained Johnson Matthey SDPF CRT® Particulate Filter System (Part Number: JM-SDPF-3-N-TITO-CS-10-LP DPF) consisting of a diesel oxidation catalyst and diesel particulate filter at all times the engine is in operation.

[Basis: "ATCM for Stationary Compression Ignition Engines" Section 93115.6(a)(3) or 93115.6(b)(3), title 17, CA Code of Regulations]

2. The owner/operator of S-1/A-1 shall install and maintain a backpressure monitor that notifies the owner or operator when the high backpressure limit of the engine is approached. The owner/operator shall maintain records of any corrective action taken after the backpressure monitor has notified the owner or operator that the high backpressure limit of the engine is approached 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).

[Basis: "ATCM for Stationary Compression Ignition Engines" Section 93115.10(e), title 17, CA Code of Regulations; 40 CFR 60.4214c]

End of Conditions

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 for the equipment listed below. However, the proposed source will be located within 1000 feet of a school, which triggers the public notification requirements of District Regulation 2-1-412.6. 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 Diesel Generator Set
Make: Cummins, Inc., Model: QSX15-G9, Model Year: 2019
755 bhp, 4.71 MMBtu/hour
Permit Condition No. 22850 and 27343

Abated by

A-1 Diesel Particulate Filter
Make: Johnson Matthey Inc.,
SDPF CRT® Particulate Filter System consisting of a diesel oxidation catalyst
and diesel particulate filter (Part Number: JM-SDPF-3-N-TITO-CS-10-LP DPF)

Prepared by: _____
Samantha Du, Air Quality Engineer I