

DRAFT
ENGINEERING EVALUATION (DRAFT)
Avalon Bay Communities
323-325 Octavia Street, San Francisco, CA 94102
Plant Number: 22154
Application Number: 25797

BACKGROUND

The Applicant has submitted an application for an Authority to Construct for the following:

- S-1 Emergency Standby Diesel Generator Set**
Cummins, Model QSB7-G5 NR3, Model Year 2013
324 BHP, 3.82 MMBTU/hr

to be installed at a retirement home being constructed in San Francisco, California.

EMISSION CALCULATIONS

Criteria Pollutants

Table 1 summarizes criteria pollutant emissions resulting from the planned operation of S-1

Table 1

Pollutant	Emission Factor		Emmissions		
	(g/kw-hr)	(g/hp-hr)	Annual (lb/yr)	Annual (TPY)	Maximum Daily (lb/day)
NOx + NMHC	3.70	2.76			
NOx	3.52	2.62	93.57	0.0468	44.91
NMHC (POC)	0.19	0.14	4.92	0.0025	2.36
CO	1.00	0.75	26.62	0.0133	12.78
PM10	0.10	0.07	2.66	0.0013	1.28

From Table 3.4-1 of AP-42 and sulfur content of 15ppmw

	(lb/MMBTU)			
SO2	0.001515	0.29	1.4 E-4	.14

Basis:

- 324 hp Max Rated Output
- 28 gallons/hr Max Fuel Use Rate = 3.82 MMBTU/hr Max Combustion Capacity
- 50 hr/yr maximum Non-Emergency Operations per the stationary Airborne Toxic Control Measure (ATCM)
- The (NO_x+NMHC), CO, and PM10 emission factors are from the Manufacturer's Performance Data Sheet
 NO_x is assumed to be 95% of (NMHC + NO_x)
 POC is assumed to be 5% of (NMHC + NO_x)
- The SO₂ emission factor is based on 15ppm sulfur in ULSD fuel derived from EPA AP-42, Table 3.4-1.
- Annual emissions are based on the annual limit (50hr/yr) of operation for testing and maintenance
- Max daily emissions are based on 24hr/day since no daily limits are imposed on emergency operations

Toxic Pollutants

Table 2 summarizes the emissions of all Toxic Air Contaminants listed on Table 2-5-1 resulting from the planned operation of S-1.

Table 2

Toxic Pollutant Emitted	Hourly Emissions (lb/hr)	Acute Trigger Level from Table 2-5-1 (lb/hr)	Annual Emissions (lb/yr)	Chronic Trigger Level from Table 2-5-1 (lb/yr)
Diesel Particulate PM10	0.05	N/A	2.66	0.34

Cumulative Increase

Table 3 summarizes the cumulative increase in criteria pollutants resulting from the planned operation of S-1.

Table 3

Pollutant	Pre-Existing Cumulative Increase (TPY)	Application Emissions Increase (TPY)	Final Cumulative Increase (TPY)
NOx	0	0.0468	0.0468
POC	0	0.0025	0.0025
CO	0	0.0133	0.0133
PM10	0	0.0013	0.0013
SO ₂	0	0.00	0.00

STATEMENT OF COMPLIANCE:

Regulation 2 - Permits, Rule 1 – General Requirements

Ministerial Projects (Section 2-1-311)

An application that is classified as ministerial is exempt from the CEQA requirement of *Section 2-1-310 Applicability of CEQA*. An application is considered ministerial if the District's engineering evaluation and basis for approval or denial of the permit application for the project is limited to the criteria set forth in *Section 2-1-428 Criteria for Approval of Ministerial Permit Applications* and the specific procedures, fixed standards and objective measurements set forth in the District's Permit Handbook and BACT/TBACT Workbook. Section 2.3.1 of the District's Permit Handbook sets forth evaluation guidelines for Stationary Diesel Engines and will be used to evaluate S-1. Section 2 of the District's BACT/TBACT Workbook covers Combustion Sources and will be used to determine BACT/TBACT compliance for S-1. As such, this application is classified as ministerial and S-1 is exempt from CEQA review.

Public Notice, Schools (Section 2-1-412)

A new or modified source located within 1,000 feet of the outer boundary of a K-12 school site which results in the increase in emissions of a toxic air contaminant in Table 2-5-1 of *Regulation 2, Rule 5 New Source Review of Toxic Air Contaminants* shall prepare and distribute a public notice in accordance with subsections 412.1 and 412.2 of *Regulation 2, Rule 1 General Requirements*. The outer boundary of the nearest K-12 school is less than 1,000 feet from the proposed location of S-1 and as such, S-1 is subject to the public notification requirements of this regulation.

Regulation 2 - Permits, Rule 2 – New Source Review

Best Available Control Technology Requirement (Section 2-2-301)

Any new or modified source that has the potential to emit 10.0 pounds or more per highest day of precursor organic compounds (POC), non-precursor organic compounds (NPOC), nitrogen oxides (NOx), sulfur dioxide (SO₂), PM₁₀ or carbon monoxide (CO) is required to use Best Available Control Technology as defined in *Regulation 2-2-206 Best Available Control Technology (BACT)*. S-1 triggers BACT for NOx and CO since proposed maximum daily emissions of these pollutants will exceed 10 lb/day.

BACT for this source is derived from the CARB ATCM Standards and set forth in the *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* which establishes BACT 2 emission limits of 2.85 gNOx/bhp-hr and 2.6 gCO/bhp-hr for S-1.

The more restrictive BACT1 standards are not applicable to this engine because it will be limited to operation as an emergency standby engine. Typical BACT technology which will meet the BACT 2 standards is *any engine certified or verified to achieve the applicable CARB ATCM standard*; S-1 is a CARB Certified engine with certificate #DCEXL0409AAD and as such, meets current BACT requirements.

Offset Requirements, POC and NOx (Section 2-2-302)

Federally enforceable emission offsets shall be provided for any new or modified source that emits more than 10 tons/yr of either NOx or POC. Based on the emissions as summarized in Table 1, offsets are not required for this application.

Offset Requirement, PM₁₀ and Sulfur Dioxide, NSR (2-2-303)

Regulation 2-2-303 establishes emission offset requirements for PM10 and Sulfur Dioxide from new or modified sources located at a Major Facility. Since the plant that S-1 will be operating at is not a Major Facility, S-1 is not subject to the offset requirements of *Regulation 2-2-302*.

Prevention of Significant Deterioration (PSD) (Section 2-2-304)

New major facilities and major modifications at major facilities must meet modeling requirements of *Regulation 2-2-304 PSD Requirement*. This is not a new major facility; nor is it a major modification of a major facility and therefore PSD modeling is not required for this application.

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

General (2-5-100)

Regulation 2-5-101 –Description states that any new or modified source of toxic air contaminant (TAC) shall be evaluated for potential public exposure and health risk. *Regulation 2-5-110 Exemption, Low Emission Levels* provides an exemption if, for each toxic air contaminant, the increase in emissions from the project is below the trigger levels listed in Table 2-5-1 of Regulation 2-5. The diesel particulate emissions from the planned operation of S-1 are calculated to be 2.66 lb/year which exceeds the trigger level of 0.34lb/year. Therefore S-1 is subject to the requirements of this regulation and a health risk screening analysis was performed. The analysis estimated the maximum cancer risk to be 3.5 in a million for residents, 1.7 in a million for off-site workers, and 0.2 in a million for Students at Chinese American International School based on operating the diesel engine 50 hours per year. In accordance with Regulation 2-5, this is an acceptable risk level since it has been demonstrated that the engine will meet the TBACT Standard for diesel PM.

Best Available Control Technology for Toxics (TBACT) Requirement (2-5-301)

TBACT must be applied to any new or modified source of TACs where the risk is a cancer risk greater than 1 in one million, and/or a chronic hazard index greater than 2.0. TBACT for this source is set forth in the *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* which establishes TBACT for PM10 at 0.15g/bhp-hr. S-1 will emit 0.07 g/bhp-hr and as such meets the TBACT requirement.

Regulation 6 - Particulate Matter, Rule 1 - General Requirements

Ringelmann No. 2 Limitation (Section 6-1-303)

All engines less than 1500 in³ displacement, or any engine used solely as a standby source of motive power must meet the Ringelmann No. 2 Limitations of *Regulation 6-1-303* which states that a person shall not emit from any source for a period or periods aggregating more than three minutes in any hour, a visible emission which 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. Since S-1 has a displacement of 408 in³ it is subject to and expected to comply with *Regulation 6-1-303* pending a regular inspection.

Visible Particles (Section 6-1-305)

A person shall not emit particles which 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. Since S-1 will emit a very small amount of PM10 it 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* pending a regular inspection.

Particulate Weight Limitation (Section 6-1-310)

No source of particulate matter shall emit in excess of 343 mg/dscm of exhaust gas volume. Using the PM emission rate calculated in Table 1 and expected exhaust flow of 1,428 scfm (1,271 dscfm at standard moisture content of 11%) the particulate loading of the exhaust is calculated to be 10.44 mg/scf.

$$\left[\frac{22.68 \text{ gm PM}}{\text{hr}} \right] \left[\frac{1000 \text{ mg PM}}{\text{gm PM}} \right] \left[\frac{1 \text{ min}}{1,271 \text{ scf}} \right] \left[\frac{35.1 \text{ scf}}{1 \text{ scm}} \right] \left[\frac{1 \text{ hr}}{60 \text{ min}} \right] = 10.44 \frac{\text{mg PM}}{\text{scm}}$$

Therefore, S-1 is expected to be in compliance with Regulation 6-1-310 pending a regular inspection.

Regulation 9 – Inorganic Gaseous Pollutants, Rule 1 Sulfur Dioxide

S-1 is subject to the following sections of Regulation 9, Rule 1 and will comply with all sections by burning Ultra Low Sulfur Diesel with a sulfur content of 15ppm.

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

Sulfur Dioxide emissions shall not result in ground level concentrations in excess of 0.5ppm continuously for 3 consecutive minutes or 0.25 ppm averaged over 60 consecutive minutes or 0.05ppm averaged over 24 hours.

General Emission Limitation (9-1-302)

A gas stream containing Sulfur Dioxide shall not contain sulfur dioxide in excess of 300ppm (dry).

Fuel Burning (Liquid and Solid Fuels) (9-1-304)

The sulfur content of liquid fuel burned shall not exceed 0.5% by weight.

Regulation 9 – Inorganic Gaseous Pollutants, Rule 8 NOx and CO from Stationary Internal Combustion Engines

Exemptions (Section 9-8-110)

Section 110.5 exempts emergency standby engines from the requirements of Sections 9-8-301 through 305, 501 and 503.

Emergency Standby Engines, Hours of Operation (Section 9-8-330)

S-1 is subject to the requirements of Regulation 9-8-330 which limits reliability related activity to 50 hr/yr. Permit Conditions for S-1 will include operating limits that meet this requirement.

Monitoring and Records (9-8-500)

S-1 is subject to the reporting requirements of Sections 502 and 530. Permit Conditions for S-1 will include reporting requirements that meet these standards.

Regulation 11 – National Emission Standards for Hazardous Air Pollutants

National Emission Standards for Hazardous Air Pollutants (NESHAP)

This engine is not subject to 40 CFR 63, Subpart ZZZZ, National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines, because it is not located at a major facility for hazardous air pollutants.

Other Regulations

Airborne Toxic Control Measure (ATCM) for In-Use Emergency Standby Diesel-Fueled CI Engines (>50 bhp)

The District is charged with enforcing the requirements of California’s Air Toxic Control Measure for Stationary Compression Ignition Engines Title 17, California Code of Regulations, Section 9311 for the purpose of reducing diesel particulate matter (PM) and criteria pollutant emissions from stationary diesel-fueled compression ignition (CI) engines.

Subsection 93115.6(a)(3)(A)(1)(a) sets forth Emission Standards for new stationary emergency standby diesel fueled compression ignition engines with maximum engine power between 300hp and 600hp. S-1 meets these limits and complies with the requirement of this section of the ATCM as shown in Table 4:

Table 4

Pollutant	Manufacturer’s Performance Data Sheet Emission Rate (g/bhp-hr)	ATCM Emission Standards (g/bhp-hr)
PM	0.07	0.15
NMHC + NOx	2.76	3.0
CO	0.75	2.6

Subsection 93115(a)(3)(A)(1)(b) requires that new stationary emergency standby diesel-fueled engines (>50bhp) be certified to the emission standards as specified in 40 CFR, Part 60, Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. The Manufacturer’s Specification Sheet shows that S-1 has been certified to meet EPA Tier 3 standards and therefore, S-1 complies with this section of the ATCM.

Subsection 93115(a)(3)(A)(1)(c) limits the non-emergency operation of 50 hours/year for maintenance and testing. Permit Conditions for S-1 will limit non-emergency operation of S-1 to 50 hours/year and as such S-1 will comply with this section of the ATCM.

New Source Performance Standards (NSPS)

According to 40 CFR Section 60.4200(a)(1)(i) engines are subject to 40 CFR 60, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines if they have a displacement of less than 30 liters per cylinder where the model year is 2007 or later, for engines that are not fire pump engines.

S-1 is subject to Subpart IIII because it is a 6 cylinder engine with a total displacement of 6.7 liters, so each cylinder has a volume of less than 30 liters; and the engine is a 2013 model year engine and is not a fire pump. Section 60.4205(b)

requires that owners and operators of these engines comply with the emission standards in Section 60.4202, which refers to 40CFR89.112 and 40CFR89.113 for all pollutants. S-1 meets the limits for engines greater than 300 hp and less than 600 hp, as shown in Table 5:

Table 5

Pollutant	Manufacturer's Performance Data Sheet Emission Rate (g/bhp-hr)	40CFR89.112 Emission Limits (g/bhp-hr)
PM	0.07	0.15
NMHC + NOx	2.76	3.0
CO	0.75	2.6

Sections 60.4206 and 60.4211(a) require that the owner/operator operate and maintain the engine according to the manufacturer's written instructions or procedures developed by the owner or operator that are approved by the engine manufacturer, over the entire life of the engine. The owner/operator is expected to comply with this requirement.

Section 60.4207(a) requires that by October 1, 2007, the owner/operator must use fuel that complies with 40 CFR 80.510(a). This means that the fuel must have a sulfur content of 500 parts per million (ppm) maximum, a cetane index of 40 or a maximum aromatic content of 35 volume percent. The owner/operator is expected to comply with this requirement because CARB diesel is required to be used in California.

Section 60.4207(b) requires that by October 1, 2010, the owner/operator must use fuel that complies with 40 CFR 80.510(b). This means that the fuel must have a sulfur content of 15 parts per million (ppm) maximum, and a cetane index of 40 or a maximum aromatic content of 35 volume percent. The owner/operator is expected to comply with this requirement because CARB diesel is required to be used in California.

Section 60.4209(a) requires a non-resettable hour meter. S-1 will be subject to standard permit conditions that includes this requirement.

The engine will comply with the requirements of Section 60.4211(c) because it has been certified in accordance with 40 CFR Part 89.

The engine will comply with the requirement in Section 60.4211(e) to run for less than 100 hours per year for maintenance checks and readiness testing, and the prohibition of running for any reason other than emergency operation, maintenance, and testing because S-1 will be subject to standard permit conditions limiting operation to 50 hours per year for reliability testing except for operating during emergencies.

The owner/operator is not required to perform tests in accordance with Section 60.4212 or 60.4213.

Section 60.4214 states that owner/operators do not have to submit an initial notification to EPA for emergency engines.

Because the engine does not have a diesel particulate filter, the owner/operator is not subject to Section 60.4214(c).

The owner/operator is required to comply with certain sections of 40 CFR 60, Subpart A, General Provisions. The owner/operator is expected to comply with this requirement.

CONDITIONS

I recommend the following permit conditions:

COND# 22850 -----

1. The owner/operator shall not exceed 50 hours per year per engine for reliability-related testing [Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)(3) or (e)(2)(B)(3)]
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: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection(e)(2)(A)(3) or (e)(2)(B)(3)]

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: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection(e)(4)(G)(1)]

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: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection e)(4)(I), (or, Regulation 2-6-501)]

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, playground, athletic field, or other areas of school property but does not include unimproved school property.

[Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)(1) or (e)(2)(B)(2)]

RECOMMENDATIONS:

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 emit a toxic air contaminant in excess of the Table 2-5-1 trigger level and 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
Cummins, Model QSB7-G5 NR3, Model Year 2013
324 BHP, 3.82 MMBTU/hr**

Anne C Werth
Air Quality Engineer

11/26/2013