ENGINEERING EVALUATION

Plant No. 203115
BHOGC 2225 Bayshore Owner LLC
225 East Bayshore Road, Palo Alto, CA 94303
Application No. 678704

BACKGROUND

BHOGC 2225 Bayshore Owner LLC has applied for an Authority to Construct/Permit to Operate for the following equipment:

S-1 Emergency Backup Diesel Generator
Engine Make: John Deere, Model: 6135HFG75A, Family NJDXL13.5132
Model Year: 2022, 755 BHP, 571 kW, 4.916 MMBtu/hour

Abated by

A-1 CARB certified Diesel Catalyzed Particulate Filter (DCPF)
Make: Johnson Matthey Model: JM-CRT(+)-3-N-CS-BIT0-10/10-LP
CARB Executive Order: DE-08-009-12

S-1 is a Tier 3 engine whose diesel exhaust particulate matter (DEPM) emissions will be abated by A-1. 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.

S-1 will emit the following pollutants:
Oxides of nitrogen (NOx), Precursor organic compounds (POC), Carbon monoxide (CO), Particulate matter with aerodynamic diameter smaller than or equal to a nominal 10 microns (PM10), Particulate matter with aerodynamic diameter smaller than or equal to a nominal 2.5 microns (PM2.5), and Sulfur dioxide (SO2).

EMISSIONS

Table 1. Annual and Daily Emissions from S-1

Pollutant	Emission Factor[1] (g/bhp-hour)	Max Daily Emissions (pounds/day)	Abatement	Annual Emissions (pounds/year)	Annual Emissions (tons/year)
NOx	4.04	161.24		335.93	0.168
POC	0.21	4.19	50%[4]	8.73	0.004
CO	0.37	5.91	60%[4]	12.31	0.006
PM_{10}	0.05	0.30	85%[5]	0.62	0.000
$PM_{2.5}$	N/A[2]	0.30	85%[5]	0.62	0.000
SO_2	N/A[3]	0.19		0.39	0.000

Basis:

- Annual emissions: Reliability-related activity set at 50 hours for S-1
- Maximum daily emissions: 24-hour operation
- [1]Emission factors for EPA engine family NJDXL13.5132 were not available so they were calculated from the EPA certified Carryover family CJDXL13.5132

- [2] $PM_{2.5} = PM_{10}$
- [3] SO_2 emission factor calculated based on the following:
    - Complete conversion of sulfur in fuel to SO_2 and a maximum sulfur content of 15 ppm.
    - Density of Ultra Low Sulfur Diesel Fuel = 7.31 lb/gal
    - Fuel Consumption Rate = 35.5 gal/hr
    - MW(SO_2)=64.066 g/mole, MW(S)=32.065 g/mol
    - $E_{SO_2} = \left(\frac{15\ lb\ S}{10E{+}06\ lb\ fuel}\right)\left(7.31\ \frac{lb\ fuel}{gal\ fuel}\right)\left(35.5\frac{gal\ fuel}{hr}\right)\left(\frac{64.066\ {}^{g}/_{mol}}{32.065\ {}^{g}/_{mol}}\right)\left(50\frac{hr}{yr}\right)$

$$E_{SO_2} = 0.19\ {}^{lb}/_{day} = 0.39\ {}^{lb}/_{yr} = 0.000\ {}^{ton}/_{yr}$$

- [4] POC and CO abatement efficiencies for DICE equipped with DCPF suggested in "Engineer Guidelines for Screening Form ICE Prior to Data Entry".
- [5] DCPF abatement efficiency specified in CARB Executive Order DE-08-009-12

CUMULATIVE INCREASE

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	0.168	0.168
POC	0	0.004	0.004
CO	0	0.006	0.006
PM_{10}	0	0.000	0.000
$PM_{2.5}$	0	0.000	0.000
SO_2	0	0.000	0.000

HEALTH RISK ASSESSMENT (HRA)

The proposed engine will emit diesel exhaust particulate matter, which is a TAC under BAAQMD Regulations. BAAQMD Regulation 2, Rule 5 specifies that diesel exhaust particulate matter will be used as a surrogate for all TAC emissions from diesel-fueled compression-ignition internal combustion engines, as this is the principal driver of the health risk associated with this type of equipment. The calculated emissions increase of diesel exhaust particulate matter associated with the project are summarized in the table below. The project does not include any related New Source Review applications for new or modified sources permitted within the previous five-year period (per BAAQMD Reg 2-5-216).

Table 3. Hourly and Annual Project TAC Emissions

Pollutant	Hourly	Annual	Acute Trigger (lbs/hr)	Chronic Trigger (lbs/yr)	Exceeds Acute Trigger?	Exceeds Chronic Trigger?
	lbs/hr	lbs/year				
Diesel PM (diesel exhaust	N/A	0.62	N/A	0.26	N/A	YES

particulate matter)						

Regulation 2-5-402 requires a Health Risk Assessment (HRA) if TAC emissions exceed the screening thresholds set forth in Table 2-5-1 in Regulation 2, Rule 5. For this project, the emissions of diesel particulate matter exceed the Table 2-5-1 screening threshold for chronic risk, respectively.

This project qualifies for the HRA Streamlining Policy because the facility is not located in an overburdened community, the nearest offsite receptor is greater than 300 feet away, and the total engine diesel PM emissions are less than 10 pounds/year. Therefore, a refined HRA was not required.

Compliance with Regulation 2-5 is therefore satisfied.

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 (PTE) 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, S-1's PTE for NOx exceeds 10.0 or more pounds on any day and triggers BACT.

BACT for S-1 is presented in the current BAAQMD BACT/TBACT Workbook for IC Engine – Compression Ignition: Stationary Emergency, non-Agricultural, non-direct drive fire pump, for engines greater than or equal to 50 bhp and less than 1,000 bhp: Document #96.1.3, Revision 8, dated 12/22/2020. For NOx, BACT(2) is 4.56 g/bhp-hour. The more restrictive BACT(1) standards are not applicable to S-1 because it will be limited to operate as an emergency standby engine.

S-1 satisfies the current BACT(2) standards for NOx as shown in Table 4.

Table 4. BACT check

Pollutant	Emission Factor	BACT(2) Standard
NOx	4.04 g/bhp-hour	4.56 g/bhp-hour

OFFSETS

BHOGC 2225 Bayshore Owner LLC is a new facility and doesn't have any sources of air emissions. S-1 will be the facility's first permitted source. 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 5.

Table 5. Offsets

Pollutant	Pre-Application PTE (tons/year)	S-1's PTE (tons/year)	Facility PTE (tons/year)	Offset Triggers	Offsets Required (Yes/No)
NOx	0	0.504	0.504	>10	No
POC	0	0.013	0.013	>10	No

CO	0	0.018	0.018	N/A	N/A
PM_{10}	0	0.001	0.001	>100	No
$PM_{2.5}$	0	0.001	0.001	>100	No
SO_2	0	0.001	0.001	>100	No

It can be seen from Table 5 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:

Regulation 6-1 (*Particulate Matter – General Requirements*)

S-1 is subject to Regulation 6, Rule 1. Opacity and visible emissions from S-1 is limited by Regulation 6-1-303.2 (engine used solely as a standby source of motive power) to an opacity of No. 2 on the Ringelmann chart.

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 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 are expected to comply with the applicable SO_2 limitations in Regulation 9, Rule 1 ("Inorganic Gaseous Pollutants – Sulfur Dioxide"). Because SO_2 emissions from S-1 are negligible, it is unlikely the APCO will require BHOGC 2225 Bayshore Owner LLC 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 – NOx 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.

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

The Air District is charged with enforcing the requirements of California's Air Toxic Control Measure for Stationary Compression Ignition Engines in Title 17, California Code of Regulations, Sections 93115 *et seq*. (ATCM)

Subsection 93115.6(a)(3)(A)(1)(a) requires S-1 to meet the emissions standards specified in Table 6 below. (These emissions standards expressed as g/bhp-hour are essentially the same as EPA's Tier 2 standards, which are expressed as g/kW-hour.[1]) The generator will have emission rates that comply with these requirements as shown in Table 6.

Table 6. Engine Emission Rates vs. ATCM Emission Standards (g/bhp-hour)

Pollutant	Emissions Rate S-1	ATCM Emission Standards
PM	0.05	0.15
NMHC + NO_x (NMHC: Non-methane hydrocarbon)	4.25	4.8
CO	0.37	2.6

Subsection 93115.6(a)(3)(A)(1)(b) requires that the generator be certified to meet EPA's Tier 2 emission standards as required under the NSPS discussed below. The generator meets EPA Tier 2 standards.

Subsection 93115.6(a)(3)(A)(1)(c) limits the non-emergency operation of the engine to 50 hours/year for maintenance and testing. Permit Condition 100073 will limit non-emergency operation of S-1 to 50 hours/year and hence will comply with this subsection.

California Environmental Quality Act (*CEQA*)

This project is ministerial under the District Regulation 2-1-311 (Permit Handbook Chapter 2.3.1) and therefore is not subject to CEQA review per CCR § 15369.

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 Tier 2 or Tier 3 emissions standards in 40 CFR 1039, Appendix I for all pollutants.

Applicable emission Tier 2 standards found in Appendix I of 40 CFR 1039 that apply to S-1 are:
NMHC + NOx = 6.4 gram/kW-hour (4.8 gram/bhp-hour);
CO = 3.5 gram/kW-hour (2.6 gram/bhp-hour); and
PM = 0.20 gram/kW-hour (0.15 gram/bhp-hour).

Emission rates for the above pollutants summarized in Tables 1 and 6 in this evaluation shows 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:

[1] The conversion factor for converting engine output in horsepower to kilowatts is 1.341 hp/kw. Applying this conversion factor to the ATCM standards shows that they are essentially identical to EPA's Tier 2 standards.

- 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 will comply 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 a K-12 school site (Fusion Academy Palo Alto located at 2191 E Bayshore Road Suite 100, Palo Alto, CA 94303). Therefore, S-1 is subject to the public notification requirements of Regulation 2-1-412.

Overburdened Communities Notification (*Regulation 2-1-412*)

S-1 is not located within an Overburdened Community as defined in Regulation 2-1-243. Therefore, S-1 is not subject to the public notification requirements of Regulation 2-1-412.

PERMIT CONDITIONS

Permit Condition #100072 for S-1

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.

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[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]

Permit Condition #100073 for S-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]

Permit Condition #100102 for S-1

1. The owner/operator shall abate the particulate emissions from the emergency diesel engine by the Diesel Oxidation Catalyst/Particulate Filter at all times the engine is in operation. [Basis: Toxics, "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 shall comply with requirements for CARB Executive Order DE-08-009-12. [Basis: CARB Executive Order DE-08-009-12, "ATCM for Stationary Compression Ignition Engines" Section 93115.13(f), title 17, CA Code of Regulations, Toxics, Sections 2700 through 2711 of title 13, CA Code of Regulations]

End of Conditions

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RECOMMENDATION

The Air District has evaluated the permit application for the proposed project and has made a preliminary determination that the project is expected to comply with all applicable District, state, and federal air quality-related regulations, including the health risks resulting from toxic air contaminant emissions. The preliminary recommendation is to issue a permit for this project. After considering all comments received, the Air District will make a final determination.

I recommend that the Air District initiate the public comment period 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 Backup Diesel Generator
Engine Make: John Deere, Model: 6135HFG75A, Family NJDXL13.5132
Model Year: 2022, 755 BHP, 571 kW, 4.916 MMBtu/hour

Abated by

A-1 CARB certified Diesel Catalyzed Particulate Filter (DCPF)
Make: Johnson Matthey Model: JM-CRT(+)-3-N-CS-BIT0-10/10-LP
CARB Executive Order: DE-08-009-12

_____ Date: _____
Chris Thompson
AQ Engineer I

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