

DRAFT
ENGINEERING EVALUATION REPORT
NAZARETH HOUSE OF SAN RAFAEL
PLANT NUMBER 1430
APPLICATION NUMBER 25185

245 Nova Albion Way
San Rafael, CA 94903

BACKGROUND

Nazareth House has applied to obtain a Permit to Operate the following equipment, which has been operated since 2009 without a District permit:

**S-2 Emergency Standby Diesel Engine-Generator Set, Detroit Diesel;
Model: S80, 4 cycle/2007; Rated Horsepower 490 HP**

This emergency engine-generator set must be periodically tested to ensure that it will generate power when needed.

EMISSIONS

Annual Emissions:

For emergency standby diesel engines, emissions are calculated based on reliability-related operation at 100% load using emission factors approved by CARB. For this application, the applicant has requested 50 hours per year for reliability-related operation. The CARB Certified emission factors for S-2 (490 HP- diesel engine, U-R-007-0107) are listed in Table 1 below:

Table 1

Component	Emission (g/kW-hr)	Emission (g/bhp-hr)
NO _x + POC	3.9	2.91
CO	1.2	0.89
PM ₁₀	0.18	0.134
SO ₂	0.002	0.001

**The emission factor for SO₂ is from Chapter 3, Table 3.4-1 of the EPA Document AP-42, Compilation of Air Pollutant Emission Factors.*

SO₂ 8.09E-3 (% S in fuel oil) lb/hp-hr = 8.09E-3 (0.0015% S) (454 g/lb) = 0.0014 g/hp-hr = 0.002 g/kw-hr

In accordance with District policy, 95% and 5% of the combined emission factor of NO_x + POC are assumed to be NO_x and POC, respectively. Hence, the NO_x and POC emission factors are 3.705 and 0.195 g/kW-hr, respectively.

Table 2: Annual Emissions

Component	g/kW-hr	hp	kW/hp	hr/yr	lb/g	lb/yr	TPY
NOx	= 3.705	490	0.7457	50	0.0022046	= 149.23	= 0.075
CO	= 1.200	490	0.7457	50	0.0022046	= 48.33	= 0.024
POC	= 0.195	490	0.7457	50	0.0022046	= 7.85	= 0.004
PM10	= 0.180	490	0.7457	50	0.0022046	= 7.25	= 0.004
SO2	= 0.002	490	0.7457	50	0.0022046	= 0.08	= 0.000

Maximum Daily Emissions:

A full 24-hour day will be assumed since no daily limits are imposed on intermittent and unexpected operations.

Table 3: Daily Emissions

POLLUTANT	g/kW-hr	hp	kW/hp	hr/day	lb/g	lb/day
NOx	= 3.705	490	0.7457	24	0.0022046	= 72
CO	= 1.200	490	0.7457	24	0.0022046	= 23
POC	= 0.195	490	0.7457	24	0.0022046	= 4
PM10	= 0.180	490	0.7457	24	0.0022046	= 3
SO2	= 0.002	490	0.7457	24	0.0022046	= 0

Plant Cumulative Increase: (tons/year)

Table 4

POLLUTANT	Existing	New	Total
NOx	0	0.075	0.075
CO	0	0.024	0.024
POC	0	0.004	0.004
PM10	0	0.004	0.004
SO2	0	0.000	0.000

Toxic Risk Screening:

The toxic emission of diesel particulate does exceed the District Risk Screening Trigger, as shown in Table (2) below. A Risk Screening Analysis has been performed.

Table 5

Source	PM ₁₀ Emission Factor (g/bHP-hr)	HP	Annual Usage (Hours/year)	Diesel Exhaust Particulate Emissions (lb/year)	Trigger Level (lb/yr)	Risk Screen Required? (Yes/No)
1	0.134	490	50	7.24	0.58	YES

Since the engine meets Best Available Control Technology for Toxics (TBACT) requirements (emission level of 0.15 g/hp-hr or less), the maximum acceptable cancer risk is 10 in a million. Results from the health risk screening analysis (interoffice memo dated 5/21/2013) show that for 50 hours of operation per year, excluding periods when

operation is required due to emergency conditions, the risk to the maximally exposed nearest residence is 8.3 in a million and to off-site workers is 1.24 in a million. The risk to students who attend Vallecito Elementary school is 0.68 in a million and to students who attend Terra Linda High school is 0.37 in a million. The analysis was performed at a PM₁₀ emission of 7.231 lb/year. In accordance with the District's Regulation 2, Rule 5, this risk level is acceptable.

The ISCST3 air dispersion computer model was used to estimate annual average ambient air concentrations. Stack and building parameters for the analysis were based on information provided by the applicant. Estimates of residential risk assume potential exposure to annual average TAC concentrations occur 24 hours per day, 350 days per year, for a 70-year lifetime. Risk estimate for an offsite worker assumes potential exposure occurs 8 hours per day, 245 day per year, for 40 years. Risk estimate for students assumes potential exposure occur 10 hours per day, 180 days per year, for 9-year period.

Since the engine is not located within 500 feet of the nearest school, it will be allowed to be operated for reliability-related purposes between 7:30 a.m. and 3:30 p.m. on days when the school is in session.

The manufacturer supplied ISO 8178-D2 test cycle data to CARB. The CARB staff has determined that the Detroit Diesel engine model listed above is in compliance with the PM emission requirements of less than or equal to 0.15g/bhp-hr from the California Code of Regulations Title 17, Section 93115 (e)(2)(A) 3., Table 1: Summary of the Emission Standards and Operating Requirements for New Stationary Emergency Standby Diesel-Fueled CI Engines > 50 BHP. Therefore, the above Detroit Diesel engine model qualifies for use in California for standby generator set applications operating at 50 hours per year for maintenance and testing.

STATEMENT OF COMPLIANCE

S-2 will be operated as an emergency standby engine and therefore is not subject to the emission rate limits in Regulation 9, Rule 8 ("NO_x and CO from Stationary Internal Combustion Engines"). S-2 is subject to the monitoring and record keeping requirements of Regulation 9-8-530 and the SO₂ limitations of 9-1-301 (ground-level concentration) and 9-1-304 (0.5% by weight in fuel). Regulation 9-8-530 requirements are incorporated into the proposed permit conditions. Compliance with Regulation 9-1 is expected since diesel fuel with a 0.0015% by weight sulfur is mandated for use in California. Like all sources, S-2 is subject to Regulation 6, Rule 1 ("Particulate Matter, General Requirements"). This engine is not expected to produce visible emissions or fallout in violation of this regulation and they will be assumed to be in compliance with Regulation 6, Rule 1 pending a regular inspection.

ATCM

This diesel engine is subject to the Stationary Diesel Engine Air Toxics Control Measure (ATCM) and is considered a new stationary emergency standby diesel engine since it was installed after January 1, 2005 and is larger than 50 HP. The requirements of the ATCM are included in standard permit condition 22850 (for an emergency standby diesel engine

located within 500 feet of a school and allowed 50 hours of operation per year for testing and maintenance).

CEQA

This application is considered to be ministerial under the District's proposed CEQA guidelines (Regulation 2-1-312) and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emission factors in accordance with Permit Handbook Chapter 2.3.1.

Public Notification, School

The project is located within 1000 feet of two K-12 schools, The Vallecito Elementary & Terra Linda High Schools, and is therefore subject to the public notification requirements of Reg. 2-1-412. A public notice was distributed on _____ to the parents and guardians of the students of the schools identified above and to the residents of all addresses within 1000 feet of the source. The comment period ended on _____ .

Best Available Control Technology

In accordance with Regulation 2, Rule 2, Section 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 or PM₁₀.

Based on the emission calculations above, the generator set, S-2 is subject to BACT for the following pollutants: NO_x & CO. BACT 1 levels do not apply for 'engines used exclusively for emergency use during involuntary loss of power' as per Document 96.1.3 of the BAAQMD BACT Guidelines for IC Engines. Hence, the owner/operator has to meet the BACT 2 limits presented below.

**Table 6
BAY AREA AIR QUALITY MANAGEMENT DISTRICT Best Available Control
Technology (BACT) Guideline**

Source Category	IC Engine- Compression Ignition: Stationary Emergency, non- Agricultural, non- direct drive fire pump	Revision:	7
Class:	➤ 50 BHP Output	Date:	12/22/2010

Pollutant	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice 3. TBACT	Typical Technology
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NOx	1. n/sc 2. CARB ATCM standard ^a for NOx at applicable horsepower rating (see attached Table 1).	1. n/sc 2. Any engine certified or verified to achieve the applicable standard. ^a
CO	1. n/sc 2. CARB ATCM standard ^a for CO at the applicable horsepower rating (see attached Table 1).	1. n/sc 2. Any engine certified or verified to achieve the applicable standard. ^a

References

- a. ATCM standard (listed below): Where NMHC + NOx is listed (with no individual standards for NOx or NMHC) as the standard, the portions may be considered 95% NOx and 5% NMHC. For the purposes of determining BACT NMHC = POC. Any engine which has been certified or demonstrated to meet the current year tier standard may be considered compliant with the certified emission standard for that pollutant.
- c. Cost effectiveness analysis must be based on lesser of 50 hr/yr or non-emergency operation as limited by District health risk screen analysis.

**Table 7
BACT 2 Emission Limits based on CARB ATCM**

Emissions Standards for Stationary Emergency Standby Diesel-Fueled CI Engines >50 BHP g/Kw-hr (g/bhp-hr)			
Maximum Engine Power	PM	NMHC+NOx	CO
37 < KW < 56 (50 < HP < 75)	0.20 (0.15)	4.7 (3.5)	5.0 (3.7)
56 < KW < 75 (75 < HP < 100)	0.20 (0.15)	4.7 (3.5)	5.0 (3.7)
75 < KW < 130 (100 < HP < 175)	0.20 (0.15)	4.0 (3.0)	5.0 (3.7)
130 < KW < 225 (175 < HP < 300)	0.20 (0.15)	4.0 (3.0)	3.5 (2.6)
225 < KW < 450 (300 < HP < 600)	0.20 (0.15)	4.0 (3.0)	3.5 (2.6)
450 < KW < 560 (600 < HP < 750)	0.20 (0.15)	4.0 (3.0)	3.5 (2.6)
KW > 560 (HP > 750)	0.20 (0.15)	6.4 (4.8)	3.5 (2.6)

The NOx emission factor is 2.765 g/bhp-hr. The CO emission factor is 0.89 g/bhp-hr. Since the NOx and CO emission factors are below the emission limits above, S-2 is determined to be in compliance with the BACT 2 limits for NOx & CO.

Since CARB certification data was used to establish the NOx & CO emission factors, the BACT 2 emission limits have not been incorporated into the permit conditions and are assumed to be complied with through the design standards demonstrated by the CARB certification testing.

Offsets: Offsets must be provided for any new or modified source at a facility that emits more than 10 tons/yr of POC or NOx. Based on the emission calculations above, offsets are not required for this application.

New Source Performance Standard (NSPS)

The engine is subject to 40 CFR 60, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engine because it was manufactured after April 1, 2006, as required by Section 60.4200(a)(2)(i).

The engine has a total displacement of 14 liters. Therefore, each cylinder has a volume (2.33 liters) of less than 10 liters. The engine is a 2007 model year tier III engine and is not a fire pump. Section 60.4205(b) requires non-fire pump engines below 10 liters per cylinder to comply with the emission standards in Section 60.4202, which refers to 40 CFR 89.112 and 40 CFR 89.113 for all the pollutants. For engines less than 600 hp, these standards are:

- NMHC+NO_x: 3.0 g/hp-hr
- CO: 2.6 g/hp-hr
- PM: 0.15 g/hp-hr
- 20% opacity during acceleration mode
- 15% opacity during lugging mode
- 50% opacity during peaks in acceleration or lugging mode

The engine will comply with the above standards.

The engine does not have a diesel particulate filter. Therefore, it is not subject to the backpressure monitor requirement in Section 60.4209(b) or the notification requirements of 60.4214(c).

Sections 60.4206 and 60.4211(a) requires 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 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 sulfur content of 15 parts per million (ppm) maximum, and the same cetane index or aromatic content as above. 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. This requirement is already in the standard permit conditions.

The engine will comply with the requirements of Section 60.4211(c) because this engine is 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 it is limited by permit condition to 50 hours per year for reliability testing and otherwise may only operate for 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/operator do not have to submit an initial notification to EPA for emergency engines.

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.

NESHAPS

This facility is an area source for the purpose of Subpart ZZZZ. Since the engine meets the requirements of 40 CFR part 60 subpart IIII and 40 CFR part 63 subpart ZZZZ (section 63.6590(c)(1), no further requirements of subpart ZZZZ apply.

PSD does not apply.

PERMIT CONDITIONS

Application 25185;
Plant 1430; Nazareth House of San Rafael

Conditions for S-2 Emergency Standby Diesel Engine: Make: Detroit Diesel; Model: S80, 4-cycle; Rated Horsepower: 490 HP

Permit Condition Number 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)]

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 a Permit to Operate (waive 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. After the comments are received and reviewed, the District will make a final determination on the permit.

The public notification commenced on _____ and expired on _____.

**S-2 Emergency Standby Diesel Engine-Generator Set, Detroit Diesel;
Model: S80 4-cycle/2007; Rated Horsepower 490 HP**

By: _____ Date: _____
Dharam Singh, PE
Air Quality Engineer