

DRAFT
ENGINEERING EVALUATION
COUNTY OF MARIN, STRAWBERRY CIRCLE PUMP STATION
PLANT NO. 19096
APPLICATION NO. 18163

BACKGROUND

County of Marin is applying for an Authority to Construct and/or Permit to Operate a standby generator.

S-1 Emergency Standby Generator Set: Diesel Engine; Make Cummins; Model QSB5 G3 NR3; Model Year 2008; Rated Horsepower 145 HP.

The standby generator will be located at their Strawberry Circle Pump Station, 117 East Strawberry Drive, Mill Valley, CA 94941. This source is inside the property boundary of Strawberry Point Elementary School.

EMISSIONS SUMMARY

Annual Emissions:

Basis:

- 145 bhp output rating for full-load, standby operation
- 50 hours/year operation for reliability-related activities
- NO_x, POC, CO, and PM₁₀ emission factors per CARB Certification data (Executive Order U-R-002-0442)

Pollutant	Emission Factor (g/kw-hr)	Emission Factor (g/hp-hr)
NO _x	3.61	2.69
CO	0.90	0.67
POC	0.19	0.14
PM ₁₀	0.13	0.10

- 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, which is based on full conversion of fuel sulfur to SO₂ and which will therefore be considered applicable to any diesel engine (sulfur content will be assumed to be the California limit of 0.0015 wt% sulfur):

$$\text{SO}_2 = 8.09\text{E-}3 \text{ (\% S in fuel oil) lb/hp-hr} = 8.09\text{E-}3 \text{ (0.0015\% S) (454 g/lb)} = 0.000055 \text{ g/hp-hr}$$

For S-1,

$$\begin{aligned} \text{NO}_x &= (2.69 \text{ g/hp-hr}) (145 \text{ hp}) (50 \text{ hr/yr}) (\text{lb}/454\text{g}) = 42.99 \text{ lb/yr} = 0.021 \text{ TPY} \\ \text{CO} &= (0.67 \text{ g/hp-hr}) (145 \text{ hp}) (50 \text{ hr/yr}) (\text{lb}/454\text{g}) = 10.72 \text{ lb/yr} = 0.005 \text{ TPY} \\ \text{POC} &= (0.14 \text{ g/hp-hr}) (145 \text{ hp}) (50 \text{ hr/yr}) (\text{lb}/454\text{g}) = 2.26 \text{ lb/yr} = 0.001 \text{ TPY} \end{aligned}$$

$$\text{PM}_{10} = (0.10 \text{ g/hp-hr}) (145 \text{ hp}) (50 \text{ hr/yr}) (\text{lb}/454\text{g}) = 1.55 \text{ lb/yr} = 0.001 \text{ TPY}$$

$$\text{SO}_2 = (0.000055 \text{ g/hp-hr}) (145 \text{ hp}) (50 \text{ hr/yr}) (\text{lb}/454\text{g}) = 0.001 \text{ lb/yr} = 0.000 \text{ TPY}$$

Maximum Daily Emissions:

Daily emissions are calculated to establish whether a source triggers the requirement for BACT (10 lb/highest day total source emissions for any class of pollutants). A full 24-hour day will be assumed since no daily limits are imposed on intermittent and unexpected operations.

For S-1,

$$\text{NO}_x = (2.69 \text{ g/hp-hr}) (145 \text{ hp}) (24 \text{ hr/day}) (\text{lb}/454\text{g}) = 20.63 \text{ lb/day}$$

$$\text{CO} = (0.67 \text{ g/hp-hr}) (145 \text{ hp}) (24 \text{ hr/day}) (\text{lb}/454\text{g}) = 5.14 \text{ lb/day}$$

$$\text{POC} = (0.14 \text{ g/hp-hr}) (145 \text{ hp}) (24 \text{ hr/day}) (\text{lb}/454\text{g}) = 1.09 \text{ lb/day}$$

$$\text{PM}_{10} = (0.10 \text{ g/hp-hr}) (145 \text{ hp}) (24 \text{ hr/day}) (\text{lb}/454\text{g}) = 0.74 \text{ lb/day}$$

$$\text{SO}_2 = (0.000055 \text{ g/hp-hr}) (145 \text{ hp}) (24 \text{ hr/day}) (\text{lb}/454\text{g}) = 0.000 \text{ lb/day}$$

Plant Cumulative Increase: (tons/year)

Pollutant	Current	Application Increase	New Total
NO _x	0	0.021	0.021
CO	0	0.005	0.005
POC	0	0.001	0.001
PM ₁₀	0	0.001	0.001

Toxics Risk Screening:

The toxic emission of diesel particulate does exceed the District Risk Screening Trigger, as shown in the table below, and a Health Risk Screening Analysis has been performed.

Table: Calculated incremental increase in diesel exhaust particulate matter for S-1

Source:	PM ₁₀ Emission Factor (g/HP-hr)	HP	Annual Usage (Hours/year)	Diesel Exhaust Particulate Emissions (lb/year):	Trigger Level (lb/yr)	Risk Screen Required? (Yes/No)
S-1	0.10	145	50	1.55	0.58	Yes

Per the attached July 22, 2008 memo from Daphne Chong, results from the health risk screening analysis indicate that the maximum cancer risk is 2.2 in a million and the maximum chronic non-cancer hazard index is 0.001 for 50 hours of operation per year. In accordance with the District's Regulation 2, Rule 5, this risk level is considered acceptable, as it has been determined that the engine meets the current TBACT standards (emission level of 0.15 g/hp-hr or less).

PUBLIC NOTIFICATION

The project is within 1000 feet of a public school and therefore subject to the public notification requirements of Regulation 2-1-412. A public notice will be prepared and posted on the Internet. The public notice will be mailed to all Parents or Guardians with children enrolled at Strawberry Point School and all residential and business neighbors located within 1000 feet of the proposed new source of pollution.

STATEMENT OF COMPLIANCE

The owner/operator of S-1 shall comply with Regulation 6, Rule 1 (Particulate Matter and Visible Emissions Standards) and Regulation 9-1-301 (Inorganic Gaseous Pollutants: Sulfur Dioxide for Limitations on Ground Level Concentrations). Since this engine meets TBACT for PM₁₀ (<0.15 g/hp-hr), it is expected to comply with Regulation 6, Rule 1. Ultra-low sulfur diesel (15 PPM sulfur) will be used to meet the sulfur limitation of 0.5wt% in Regulation 9-1-304 as well as to minimize PM₁₀ emissions. Because S-1 is an emergency standby generator, Regulation 9-8-110 (Inorganic Gaseous Pollutants: Nitrogen Oxides from Stationary Internal Combustion Engines) exempts the requirements for emission limits of Sections 9-8-301, 302, and 502. Allowable operating hours and the corresponding record keeping in Regulation 9-8-330 and 530 will be included in the Permit Conditions below.

This diesel engine is subject to the Stationary Diesel Airborne Toxics Control Measure (ATCM) and is considered a new stationary emergency standby diesel engine since it will be installed after January 1, 2005 and is larger than 50 HP. The requirements of the ATCM will be included in the permit conditions.

The project is considered to be ministerial under the District's CEQA regulation 2-1-311 and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emissions factors outlined in the Permit Handbook Chapter 2.3 and therefore is not discretionary as defined by CEQA.

Best Available Control Technology (BACT):

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 owner/operator of S-1 is subject to BACT for the following pollutant: NO_x. BACT 1 levels do not apply for 'engines used exclusively for emergency use during involuntary loss of power' as per Reference b, Document 96.1.2 of the BAAQMD BACT Guidelines for IC Engines. Hence, the owner/operator has to meet BACT 2 limit presented below.

POLLUTANT	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice 3. TBACT	TYPICAL TECHNOLOGY
NOx	1. 1.5 g/bhp-hr [107 ppmvd @ 15% O ₂] ^{a,b} 2. 6.9 g/bhp-hr [490 ppmvd @ 15% O ₂] ^{a,b,c} 3. 6.9 g/bhp-hr [490 ppmvd @ 15% O ₂]	1. Selective Catalytic Reduction (SCR) + Timing Retard + Turbocharger w/ Intercooler ^{a,b} 2. Timing Retard $\leq 4^\circ$ + Turbocharger w/ Intercooler ^{a,b,c} 3. Timing Retard $\leq 4^\circ$ + Turbocharger w/ Intercooler

The NOx emission limit set by BACT 2 is met, as shown in the table below.

Pollutant	Engine Emission Factor (g/hp-hr)	Emission Factor Limit as set by BACT 2 (g/hp-hr)	Has the limit been met?
NOx	2.69	6.9	YES

Therefore, S-1 is determined to be in compliance with the BACT 2 limit for NOx .

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 Standards (NSPS):

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

The engine has a total displacement of 4.5 liters and 4 cylinders. Therefore, each cylinder has a volume of less than 10 liters. The engine is a 2008 engine and is not a fire pump. Section 60.4205(b) requires these engines to comply with the standards in Section 60.4202 that apply to the same model year and maximum engine power. For engines above 50 hp, below 3000 hp, and that have a displacement less than 10 liters per cylinder, the requirement is to comply with the certification standards in 40 CFR 89.112 and 89.113 for all pollutants.

For engines between 70 kW and 130 kW, the standards in Section 89.112 are:

- NMHC + NOX: 4.0 g/kW-hr
- CO: 5.0 g/kW-hr
- PM: 0.30 g/kW-hr

According to CARB Executive Order U-R-002-0442, this engine will comply with these standards.

Section 89.113 states that the exhaust opacity must not exceed:

- 20 percent during acceleration

- 15 percent during lugging
- 50 percent during peaks in acceleration or lugging modes

The engine has been certified by EPA and therefore will comply with the above standards.

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 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 the facility 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 does not have to submit an initial notification to EPA for emergency engines.

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

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.

For 2007 model year and later engines, Section 60.4211(c) requires that the owner/operator purchase an engine certified to the emissions standard in Section 60.4205(b), and install and configure the engine according to the manufacturer's specifications. Compliance with the requirement of purchasing a certified engine is expected since the Authority to Construct is only issued to the engine being evaluated and the engine meets the emissions standard in Section 60.4205(b) as discussed above.

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 maximum sulfur content of 500 parts per million (ppm), a cetane index of 40 or a maximum aromatic content of 35 volume percent. 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 maximum sulfur content of 15 parts per million (ppm), and the same cetane index or aromatic content. California Air Resource Board (CARB) Diesel Fuel, which has a maximum sulfur content of 15 ppm and a maximum aromatic content of 10 to 25 volume percent, will be used as agreed by the applicant. Staff in the Stationary Source Division of CARB indicates that some certified diesel fuel in California may have a maximum aromatic content greater than 10 percent if the fuel has been demonstrated to have an equal or greater emission benefit as diesel fuel with maximum aromatic content of 10 percent, but no certified fuel has had an aromatic content greater than 25 percent.

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

Incorporation of applicable requirements in 40 CFR 60, Subpart III into the standard permit condition is currently under management's consideration. If it is determined to be necessary

to modify the standard condition, the modified condition will be issued to the applicant in the next permit renewal.

PSD, NESHAP do not apply.

PERMIT CONDITIONS

Application 18163; Plant 19096;
Conditions for S-1

PC22850

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

RECOMMENDATION

Issue an Authority to Construct to County of Marin for:

- S-1 Emergency Standby Generator Set: Diesel Engine; Make Cummins;
Model QSB5 G3 NR3; Model Year 2008; Rated Horsepower 145 HP.**

By: _____

Xuna Cai
Air Quality Engineer I

Date: 8/1/08