

DRAFT
ENGINEERING EVALUATION
San Francisco Federal Reserve Bank
PLANT NO. 21478
APPLICATION NO: 24711

BACKGROUND

The San Francisco Federal Reserve Bank of San Francisco California is applying for an Authority to Construct and/or Permit to Operate three existing Stationary Standby Generators.

- S-1 Stationary Standby Diesel Engine Generator: Make: Cummins; Model: QSK50-G4; Model Year; 2008; Rated Horsepower: 2220 HP**
- S-2 Stationary Standby Diesel Engine Generator: Make: Cummins; Model: QSKTA50-GE; Model Year; 2007; Rated Horsepower: 2220 HP**
- S-3 Stationary Standby Diesel Engine Generator: Make: Cummins; Model: QST30-G5; Model Year; 2008; Rated Horsepower: 1490 HP**

The standby generators are located at 101 Market Street, San Francisco California 94105.

EMISSIONS SUMMARY

Annual Emissions:

The CARB certified emission factors for S-1 and S-2 (2220 HP- diesel engine) are listed below.

Pollutant	Emission Factors (g/bhp-hr)
NOx	4.32
CO	0.90
POC	0.22
PM10	0.06
SO2	0.0055

The CARB certified emission factors for S-3 (1490 HP- diesel engine) are listed below.

Pollutant	Emission Factors (g/bhp-hr)
NOx	3.97
CO	0.67
POC	0.21
PM10	0.07
SO2	0.0055

**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.*

$$SO_2 = 8.09E-3 (\% S \text{ in fuel oil}) \text{ lb/hp-hr} = 8.09E-3 (0.0015\% S) (454 \text{ g/lb}) = 0.0055 \text{ g/hp-hr}$$

S-1 and S-2

$$\begin{aligned} NO_x &= (4.32 \text{ g/hp-hr}) (2220 \text{ hp}) (6 \text{ hr/yr}) (1\text{b}/454\text{g}) = 126.7 \text{ lb/yr} = 0.063 \text{ TPY} \\ CO &= (0.90 \text{ g/hp-hr}) (2220 \text{ hp}) (6 \text{ hr/yr}) (1\text{b}/454\text{g}) = 26.4 \text{ lb/yr} = 0.013 \text{ TPY} \\ POC &= (0.22 \text{ g/hp-hr}) (2220 \text{ hp}) (6 \text{ hr/yr}) (1\text{b}/454\text{g}) = 6.45 \text{ lb/yr} = 0.003 \text{ TPY} \\ PM_{10} &= (0.06 \text{ g/hp-hr}) (2220 \text{ hp}) (6 \text{ hr/yr}) (1\text{b}/454\text{g}) = 1.76 \text{ lb/yr} = 0.000 \text{ TPY} \\ SO_2 &= (0.0055\text{g/hp-hr}) (2220 \text{ hp}) (6 \text{ hr/yr}) (1\text{b}/454\text{g}) = 0.161 \text{ lb/yr} = 0.000 \text{ TPY} \end{aligned}$$

S-3

$$\begin{aligned} NO_x &= (3.97 \text{ g/hp-hr}) (1490 \text{ hp}) (6 \text{ hr/yr}) (1\text{b}/454\text{g}) = 78.1 \text{ lb/yr} = 0.039 \text{ TPY} \\ CO &= (0.67 \text{ g/hp-hr}) (1490 \text{ hp}) (6 \text{ hr/yr}) (1\text{b}/454\text{g}) = 13.1 \text{ lb/yr} = 0.007 \text{ TPY} \\ POC &= (0.21 \text{ g/hp-hr}) (1490 \text{ hp}) (6 \text{ hr/yr}) (1\text{b}/454\text{g}) = 4.14 \text{ lb/yr} = 0.002 \text{ TPY} \\ PM_{10} &= (0.07 \text{ g/hp-hr}) (1490 \text{ hp}) (6 \text{ hr/yr}) (1\text{b}/454\text{g}) = 1.38 \text{ lb/yr} = 0.000 \text{ TPY} \\ SO_2 &= (0.0055\text{g/hp-hr}) (1490 \text{ hp}) (6 \text{ hr/yr}) (1\text{b}/454\text{g}) = 0.108 \text{ lb/yr} = 0.000 \text{ TPY} \end{aligned}$$

Maximum Daily Emissions:

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

For S-1 and S-2:

$$\begin{aligned} NO_x &= (4.32 \text{ g/hp-hr}) (2220 \text{ hp}) (24 \text{ hr/day}) (1\text{b}/454\text{g}) = 506 \text{ lb/day} \\ CO &= (0.90 \text{ g/hp-hr}) (2220 \text{ hp}) (24 \text{ hr/day}) (1\text{b}/454\text{g}) = 105.6 \text{ lb/day} \\ POC &= (0.22 \text{ g/hp-hr}) (2220 \text{ hp}) (24 \text{ hr/day}) (1\text{b}/454\text{g}) = 25.8 \text{ lb/day} \\ PM_{10} &= (0.06 \text{ g/hp-hr}) (2220 \text{ hp}) (24 \text{ hr/day}) (1\text{b}/454\text{g}) = 7.04 \text{ lb/day} \\ SO_2 &= (0.0055 \text{ g/hp-hr}) (2220 \text{ hp}) (24 \text{ hr/day}) (1\text{b}/454\text{g}) = 0.645 \text{ lb/day} \end{aligned}$$

For S-3:

$$\begin{aligned} NO_x &= (3.97 \text{ g/hp-hr}) (1490 \text{ hp}) (24 \text{ hr/day}) (1\text{b}/454\text{g}) = 312 \text{ lb/day} \\ CO &= (0.67 \text{ g/hp-hr}) (1490 \text{ hp}) (24 \text{ hr/day}) (1\text{b}/454\text{g}) = 52.7 \text{ lb/day} \\ POC &= (0.21 \text{ g/hp-hr}) (1490 \text{ hp}) (24 \text{ hr/day}) (1\text{b}/454\text{g}) = 16.5 \text{ lb/day} \\ PM_{10} &= (0.07 \text{ g/hp-hr}) (1490 \text{ hp}) (24 \text{ hr/day}) (1\text{b}/454\text{g}) = 5.51 \text{ lb/day} \\ SO_2 &= (0.0055 \text{ g/hp-hr}) (1490 \text{ hp}) (24 \text{ hr/day}) (1\text{b}/454\text{g}) = 0.433 \text{ lb/day} \end{aligned}$$

Plant Cumulative Increase: (tons/year)

Pollutant	Existing	New S-1	New S-2	New S-3	Total
NO _x	0	0.063	0.063	0.039	0.165
CO	0	0.013	0.013	0.007	0.033
POC	0	0.003	0.003	0.002	0.008
PM ₁₀	0	0.000	0.000	0.000	0.000
SO ₂	0	0.000	0.000	0.000	0.000

Toxic Risk Screening:

The toxic emission of diesel particulate does exceed the District Risk Screening Trigger, as shown in Table (1) below, and a Risk Screening Analysis is necessary.

Table 1. Calculated incremental increase in diesel exhaust particulate matter for S-1 – S-3

Source:	PM₁₀ Emission Factor (g/HP-hr)	HP	Annual Usage (Hours/year)¹	Diesel Exhaust Particulate Emissions (lb/year):	Trigger Level (lb/yr)	Risk Screen Required? (Yes/No)
1	0.06	2220	6	1.76	0.34	Yes
2	0.06	2220	6	1.76	0.34	Yes
3	0.07	1490	6	1.39	0.34	Yes

Per the attached 10/26/2012 memo from Judy Cutino, results from the health risk screening analysis, the maximally exposed industrial receptor is 86 in a million for 50 hours of operation per year. In accordance with the District's Regulation 2-5, this risk level is not acceptable. In order to meet the requirements of Regulation 2, Rule 5, the applicant has agreed to limit reliability-related testing of each of the three engines to 6 hours per year. With these changes the maximum cancer risk is then 10 in a million, and the risk level is considered acceptable. The engine meets current TBACT requirements.

STATEMENT OF COMPLIANCE

The owner/operator of S-1 – S-3 shall comply with Reg. 6, Rule 1 Particulate Matter – General Requirements and Reg. 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 Reg. 6, Rule 1 Particulate Matter – General Requirements. Ultra-low sulfur diesel (15 PPM sulfur) will be used to meet the sulfur limitation of 0.5wt% in Reg. 9-1-304 as well as to minimize PM10 emissions. Because S-1 – S-3 are emergency standby generators, Reg. 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 Reg. 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 and therefore is not discretionary as defined by CEQA. (Permit Handbook Chapter 2.3)

The project is within 1000 feet from the nearest school and therefore is subject to the public notification requirements of Reg. 2-1-412.

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 owner/operator of S-1 – S-3 are subject to BACT for the following pollutants: NO_x, CO and POC. 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 the meet BACT 2 limits presented below.

POLLUTANT	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice 3. TBACT	TYPICAL TECHNOLOGY
NO _x	<i>n/s^c</i> 2. CARB ATCM standard ^a for NO _x at applicable horsepower rating(see attached Table 1).	1. <i>n/s^c</i> 2. Any engine certified or verified to achieve the applicable standard. ^a
CO	<i>n/s^c</i> 2. CARB ATCM standard ^a for CO at applicable horsepower rating(see attached Table 1).	1. <i>n/s^c</i> 2. Any engine certified or verified to achieve the applicable standard. ^a
POC	<i>n/s^c</i> 2. CARB ATCM standard ^a for POC at applicable horsepower rating(see attached Table 1).	1. <i>n/s^c</i> 2. Any engine certified or verified to achieve the applicable standard. ^a

References

- a. ATCM standard (listed below): Where NMHC + NO_x is listed (with no individual standards for NO_x or NMHC) as the standard, the portions may be considered 95% NO_x 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.
- b. Deleted (no longer applies).

- 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.

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 NO_x, CO and POC emission limits set by BACT 2 are met, as shown in Table (2).

Table (2)

Pollutant	Engine Emission Factors (g/hp-hr)	Emission Factor Limits as set by BACT 2 (g/hp-hr)	Have the limits been met?
NO _x	4.32	4.8	YES
CO	0.90	2.6	YES
POC	0.22	1.50	YES

Therefore, S-1 and S-2 are determined to be in compliance with the BACT 2 limits for NO_x, CO and POC.

The NO_x, CO and POC emission limits set by BACT 2 are met, as shown in Table (3).

Table (3)

Pollutant	Engine Emission Factors (g/hp-hr)	Emission Factor Limits as set by BACT 2 (g/hp-hr)	Have the limits been met?
NO _x	3.97	4.8	YES
CO	0.67	2.6	YES
POC	0.21	1.50	YES

Therefore, S-3 is determined to be in compliance with the BACT 2 limits for NO_x, CO and POC.

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

NSPS: The engines are 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).

Source 1 and Source 2 engines have a total displacement of 50.0 liters and S-3 has a total displacement of 30.0. Each cylinder has a volume of less than 10 liters. The engines are 2008, 2007 and 2008 engines. Section 60.4205(b) requires these engines to comply with the standards in Section 60.4202 for all pollutants for the same model year and maximum engine power. Section 60.4202(a)(ii) requires that engines over 50 hp must meet the EPA standards in 40 CFR 89.112 and 40 CFR 89.113. For engines above 750 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 above 750 hp, the standards are:

- NO_x + NMHC: 4.8 g/hp-hr
- CO: 2.6 g/hp-hr
- PM: 0.15 g/hp-hr

According to CARB Executive Order U-R-002-0431, U-R-002-0372 and U-R- 002-0425 the engines will comply with the all standards.

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.

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.

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 the same cetane index or aromatic content.

Section 60.4209(a) requires a non-resettable hour meter. This requirement is already in the standard permit conditions.

The engines will comply with the requirements of Section 60.4211(c) because they have been certified in accordance with 40 CFR Part 89.

The engines 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 they are 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/operators do not have to submit an initial notification to EPA for emergency engines.

Because the engines do not have a diesel particulate filter, they are 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.

NESHAP: The engines are 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.

PSD does not apply.

PERMIT CONDITIONS

Application 24711: San Francisco Federal Reserve Bank of San Francisco: Plant 21478:
Conditions for S-1 – S-3

PC 22806

- 1. The owner/operator shall not exceed 6 hours per year per engine for reliability-related testing.**

[Basis: "Regulation 2-5]

- 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)]

1. **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 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 Stationary Standby Diesel Engine Generator: Make: Cummins; Model; QSK50-G4; Model Year; 2008; Rated Horsepower: 2220 HP**
- S-2 Stationary Standby Diesel Engine Generator: Make: Cummins; Model; QSKTA50-GE; Model Year; 2007; Rated Horsepower: 2220 HP**
- S-3 Stationary Standby Diesel Engine Generator: Make: Cummins; Model; QST30-G5; Model Year; 2008; Rated Horsepower: 1490 HP**

EXEMPTIONS

None.

By: _____ Date: 10/31/2012
Sheryl Wallace
Air Quality Permit Technician