

# DRAFT

**ENGINEERING EVALUATION  
COUNTY OF ALAMEDA  
PLANT NO. 17190  
APPLICATION NO. 13046**

## BACKGROUND

County of Alameda of Oakland, California is applying for an Authority to Construct and/or Permit to Operate for the following equipment:

**S-1 Stationary Standby Generator Set: Diesel Engine; Make: Cummins; Model: QSK23-G3; Rated Horsepower: 1200 HP**

The standby generator will be located at 1221 Oak St., Oakland, CA 94612. The generator will be used for emergency purposes only and since it is located within 1000 feet of Lincoln Elementary School it will trigger the public notification process.

## EMISSIONS SUMMARY

Annual Emissions:

The CARB Certified emission factors for S-1 (1200 HP- diesel engine, U-R-002-0234) are listed in Table 1 below:

**Table (1)**

Component	Emission (g/kW-hr)	Emission (g/hp-hr)
NO <sub>x</sub>	8.2	6.115
CO	2.7	2.013
POC	0.3	0.224
PM <sub>10</sub>	0.15	0.112
SO <sub>2</sub>	0.247	0.184

*\*The emission factor for SO<sub>2</sub> is from Chapter 3, Table 3.4-1 of the EPA Document AP-42, Compilation of Air Pollutant Emission Factors.*

$$SO_2: 8.09E-3 (\% S \text{ in fuel oil}) \text{ lb/hp-hr} = 8.09E-3 (0.05\% S) (454 \text{ g/lb}) = 0.184 \text{ g/hp-hr}$$

*Tons Per Year (TPY) Calculations for S-1:*

$$\begin{aligned} \text{NO}_x &= \frac{(6.115 \text{ g/hp-hr})^*}{\text{hr}}^* (1200 \text{ hp})^* (45.6 \text{ hrs/yr})^* (0.0022 \text{ lbs/g}) = 736.15 \text{ lbs/yr} = 0.368 \text{ TPY} \\ \text{CO} &= \frac{(2.013 \text{ g/hp-hr})^*}{\text{hr}}^* (1200 \text{ hp})^* (45.6 \text{ hrs/yr})^* (0.0022 \text{ lbs/g}) = 242.33 \text{ lbs/yr} = 0.121 \text{ TPY} \\ \text{POC} &= \frac{(0.224 \text{ g/hp-hr})^*}{\text{hr}}^* (1200 \text{ hp})^* (45.6 \text{ hrs/yr})^* (0.0022 \text{ lbs/g}) = 26.97 \text{ lbs/yr} = 0.013 \text{ TPY} \\ \text{PM}_{10} &= \frac{(0.112 \text{ g/hp-hr})^*}{\text{hr}}^* (1200 \text{ hp})^* (45.6 \text{ hrs/yr})^* (0.0022 \text{ lbs/g}) = 13.48 \text{ lbs/yr} = 0.007 \text{ TPY} \end{aligned}$$

$$\text{SO}_2 = \frac{(0.184 \text{ g/hp-hr})^*}{\text{hr}} * (1200 \text{ hp}) * (45.6 \text{ hrs/yr}) * (0.0022 \text{ lbs/g}) = 22.15 \text{ lbs/yr} = 0.011 \text{ TPY}$$

### Maximum Daily Emissions:

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

#### Pounds Per Day Calculations for S-1:

NO <sub>x</sub> =	(6.115 g/hp-hr)*	(1200 hp)*	(24 hr/day)*	(0.0022 lbs/g)	387.90 lbs/day
CO =	(2.013 g/hp-hr)*	(1200 hp)*	(24 hr/day)*	(0.0022 lbs/g)	127.72 lbs/day
POC =	(0.224 g/hp-hr)*	(1200 hp)*	(24 hr/day)*	(0.0022 lbs/g)	14.19 lbs/day
PM <sub>10</sub> =	(0.112 g/hp-hr)*	(1200 hp)*	(24 hr/day)*	(0.0022 lbs/g)	7.10 lbs/day
SO <sub>2</sub> =	(0.184 g/hp-hr)*	(1200 hp)*	(24 hr/day)*	(0.0022 lbs/g)	11.67 lbs/day

Plant Cumulative Increase (tons/year) shown in Table (2).

**Table (2)**

Pollutant	Existing	New	Total
NO <sub>x</sub>	0	0.368	0.368
CO	0	0.121	0.121
POC	0	0.013	0.013
PM <sub>10</sub>	0	0.007	0.007
SO <sub>2</sub>	0	0.011	0.011
NPOC	0	0.000	0.000

### Toxic Risk Screening:

The toxic emission of diesel particulate exceeds the District Risk Screening Trigger, as shown in Table (3) below, and a Risk Screening Analysis has been performed.

**Table (3)** Calculated incremental increase in diesel exhaust particulate matter for S-1

Source:	PM <sub>10</sub> Emission Factor (g/HP-hr)	HP	Annual Usage (Hours/year) <sup>1</sup>	Diesel Exhaust Particulate Emissions (lb/year):	Trigger Level (lb/yr)	Risk Screen Required? (Yes/No)

<sup>1</sup> Annual Usage based on 45.6 hours per year of operation for reliability-related activities as defined in Regulation 9-8-330 ("Emergency Standby Engines, Hours of Operations").

1	0.112	1200	45.6	13.48	0.58	Yes
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Per the attached 9/28/05 memo from Irma Salinas, results from the health risk screening analysis indicate that the cancer risk for the maximally exposed industrial receptor is 10.0 in a million for 45.6 hours of operation per year, excluding periods when operation is required due to emergency conditions. Thus, in accordance with the District's Toxic Risk Management Policy, the screen passes.

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 continuous 70-year exposure to annual average TAC concentrations. Estimates of off-site worker risk are based on the assumption that exposure is for 46 years out of a 70-year lifetime.

### **STATEMENT OF COMPLIANCE**

The owner/operator of S-1 shall comply with Reg. 6 (Particulate Matter and Visible Emissions Standards) and Reg. 9-1-301 (Inorganic Gaseous Pollutants: Sulfur Dioxide for Limitations on Ground Level Concentrations). Since this engine meets TBACT for PM<sub>10</sub> (<0.15 g/hp-hr), it is expected to comply with Reg. 6. Low sulfur diesel (0.05wt%) will be used to meet the sulfur limitation of 0.5wt% in Reg. 9-1-304. Because S-1 is an emergency standby generator, 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.

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 over 1000 feet from the nearest school and therefore not 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<sub>x</sub>, CO, SO<sub>2</sub> or PM<sub>10</sub>.

Based on the emission calculations above, the owner/operator of S-1 is subject to BACT for the following pollutants: POC, NO<sub>x</sub>, SO<sub>2</sub>, and CO. 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 limits presented below in Table 4.

**Table (4)**

POLLUTANT	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice 3. TBACT	TYPICAL TECHNOLOGY
POC	1. 1.1 g/bhp-hr [216 ppmvd @ 15% O <sub>2</sub> ] <sup>a,b</sup> 2. 1.5 g/bhp-hr [309 ppmvd @ 15% O <sub>2</sub> ] <sup>b,c</sup>	1. Catalytic Oxidation and/or CARB or EPA (or equivalent) low-total hydrocarbon emitting certified engine <sup>a,b</sup> 2. CARB or EPA (or equivalent) low-total hydrocarbon emitting certified engine <sup>b,c</sup>
NO <sub>x</sub>	1. 1.5 g/bhp-hr [107 ppmvd @ 15% O <sub>2</sub> ] <sup>a,b</sup> 2. 6.9 g/bhp-hr [490 ppmvd @ 15% O <sub>2</sub> ] <sup>a,b,c</sup> 3. 6.9 g/bhp-hr [490 ppmvd @ 15 % O <sub>2</sub> ] <sup>d</sup>	1. Selective Catalytic Reduction (SCR) + Timing Retard + Turbocharger w/ Intercooler <sup>a,b</sup> 2. Timing Retard ≤ 4° + Turbocharger w/ Intercooler <sup>a,b,c</sup> 3. Timing Retard ≤ 4° + Turbocharger w/ Intercooler
SO <sub>2</sub>	1. n/d 2. If practical, gas-fueled engine or electric motor. If not, "California Diesel Fuel" (fuel oil < 0.05% by weight sulfur) <sup>a,b</sup>	1. n/d 2. Fuel Selection <sup>a,b</sup>
CO	1. n/s 2. 2.75 g/bhp-hr [319 ppmvd @ 15% O <sub>2</sub> ] <sup>b,c</sup>	1. Catalytic Oxidation <sup>b</sup> 2. CARB or EPA (or equivalent) low-CO emitting certified engine <sup>b,c</sup>

For POC, NO<sub>x</sub>, and CO, the emission limits set by BACT 2 are met, as shown in Table (5) below.

**Table (5)**

Pollutant	Engine Emission Factors with Catalyst (g/hp-hr)	Emission Factor Limits as set by BACT 2 (g/hp-hr)	Have the limits been met?
POC	.224	1.5	YES
NO <sub>x</sub>	6.115	6.90	YES
CO	2.013	2.75	YES

Therefore, S-1 is determined to be in compliance with the BACT 2 limits for POC, NO<sub>x</sub>, and CO.

Since CARB certification data was used to establish the POC, NO<sub>x</sub>, and CO emission factors, the BACT 2 emission limit has not been incorporated into the permit conditions and is assumed to be in compliance 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 NO<sub>x</sub>. Based on the emission calculations above, offsets are not required for this application.

**PSD, NSPS, and NESHAPS do not apply.**

**PERMIT CONDITIONS**

Conditions for S-1 Emergency Diesel Generator  
Application #13046, Plant #17190, County of Alameda:

**PC 22537**

1. Hours of Operation: The owner/operator shall operate S-1, the emergency standby engine(s) only to mitigate emergency conditions or for reliability-related activities. Operating while mitigating emergency conditions is unlimited. Operating for reliability-related activities is limited to 45.6 hours per any calendar year.  
[Basis: Toxics Risk Screening Requirements, Regulation 2-5]
  
2. The Owner/Operator shall equip the emergency standby engine(s) with
  - a. a non-resettable totalizing meter with a minimum display capability of 9,999 hours that measures the hours of operation for the engine.  
[Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(4)(G)(1)]
  
3. Records: The owner/operator shall maintain the following monthly records in a District-approved log for at least 2 years and shall make the log available for District inspection upon request:
  - a. Hours of operation (total).
  - b. Hours of operation (emergency).
  - c. For each emergency, the nature of the emergency condition.
  - d. Fuel usage for engine(s) if a non-resettable fuel usage meter is utilized.  
[Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, Subsection (e)(2)(F)(4)(I), Regulation 1-441, Toxics]

**RECOMMENDATION**

Issue an Authority to Construct to County of Alameda for:

**S-1 Stationary Standby Generator Set: Diesel Engine; Make: Cummins; Model: QSK23-G3; Rated Horsepower: 1200 HP**

**EXEMPTIONS**

None.

By: \_\_\_\_\_

Andrew Wysong  
Air Quality Engineering Intern

Date: \_\_\_\_\_