

# DRAFT

## ENGINEERING EVALUATION

**City of San Jose**  
**PLANT NO. 18408**  
**APPLICATION NO. 15990**

### BACKGROUND

City of San Jose, Fire Station # 25 of San Jose California is applying for an Authority to Construct and/or Permit to Operate a Standby Emergency Generator.

**S-1 Stationary Standby Generator Set: Diesel Engine; Make: Cummins; Model: QSL9-G2 NR3; Model Year 2007; Rated Horsepower: 198 HP; Abated by Cleaire Horizon Diesel Catalyzed Particulate Filter**

The standby generator will be located at 2125 Wilson Way, Fire Station # 25, Alviso, California 95002.

### EMISSIONS SUMMARY

#### Annual Emissions:

The CARB certified emission factors for S-1 (198 HP- diesel engine) are listed below.

Pollutant	Emission Factors (g/bhp-hr)	Abatement Efficiency 85%
NOx	2.70	0.02
CO	2.46	
POC	0.14	
PM10	0.11	
SO2	0.000055	

*\*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.*

$$SO_2 \quad 8.09E-3 \text{ (\% S in fuel oil) lb/hp-hr} = 8.09E-3 \text{ (0.0015\% S) (454 g/lb)} = 0.000055 \text{ g/hp-hr}$$

S-1

$$\begin{aligned} \text{NOx} &= (2.70 \text{ g/hp-hr}) (198 \text{ hp}) (50 \text{ hr/yr}) (1\text{b}/454\text{g}) = 58.8 \text{ lb/yr} = 0.029 \text{ TPY} \\ \text{CO} &= (2.46 \text{ g/hp-hr}) (198 \text{ hp}) (50 \text{ hr/yr}) (1\text{b}/454\text{g}) = 53.6 \text{ lb/yr} = 0.026 \text{ TPY} \\ \text{POC} &= (0.14 \text{ g/hp-hr}) (198 \text{ hp}) (50 \text{ hr/yr}) (1\text{b}/454\text{g}) = 3.05 \text{ lb/yr} = 0.001 \text{ TPY} \\ \text{PM10} &= (0.11 \text{ g/hp-hr}) (198 \text{ hp}) (50 \text{ hr/yr}) (1\text{b}/454\text{g}) = 0.436 \text{ lb/yr} = 0.000 \text{ TPY} \\ \text{SO2} &= 0.000055\text{g/hp-hr} (198 \text{ hp}) (50 \text{ hr/yr}) (1\text{b}/454\text{g}) = 0.001 \text{ lb/yr} = 0.000 \text{ TPY} \end{aligned}$$

### 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:*

NO <sub>x</sub>	=	(2.70 g/hp-hr)	(198 hp)	(24 hr/day)	(lb/454g)	=	28.2 lb/day
CO	=	(2.46 g/hp-hr)	(198 hp)	(24 hr/day)	(lb/454g)	=	25.7 lb/day
POC	=	(0.14 g/hp-hr)	(198 hp)	(24 hr/day)	(lb/454g)	=	1.46 lb/day
PM10	=	(0.02 g/hp-hr)	(198 hp)	(24 hr/day)	(lb/454g)	=	0.20 lb/day
SO <sub>2</sub>	=	(0.000055 g/hp-hr)	(198 hp)	(24 hr/day)	(lb/454g)	=	0.000 lb/day

### Plant Cumulative Increase: (tons/year)

Pollutant	Existing	New S-1	Total
NO <sub>x</sub>	0	0.029	0.029
CO	0	0.026	0.026
POC	0	0.001	0.001
PM10	0	0.000	0.000
SO <sub>2</sub>	0	0.000	0.000

### Toxic Risk Screening:

The toxic emission of diesel particulate does not exceed the District Risk Screening Trigger, as shown in Table (1) below, and a Risk Screening Analysis is not necessary.

**The emissions are below the trigger level because the engine has a diesel particulate filter. In order to ensure that the filter works properly, a back pressure monitor will be required in the permit conditions. Also, all conditions in the CARB verification of the diesel particulate filter must be fulfilled.**

These conditions are:

**The engine must be certified to a PM emission level equal to or less than 0.4 gr/bhp-hr.**

**The engine is a 2007 engine or older.**

**The engine does not have a displacement greater than 15 liters.**

**The engine does not employ exhaust gas recirculation**

**The engine does not have a pre-existing diesel oxidation catalyst from the original equipment manufacturer.**

**The engine does not have a pre-existing diesel particulate filter from the original equipment manufacturer.**

**The engine is well maintained.**

**The engine does not consume lubricating oil at a rate greater than that specified by the equipment manufacturer.**

**Oil is not mixed with the fuel.**

**The filter is not used with any other systems or engine modifications with approval from CARB and the engine manufacturer.**

**The engine will meet these conditions; therefore the filter will operate as designed.**

**The CARB verification is conditional and is only valid for 3 years. CARB expects that within the 3 years, it will confer final verification. If CARB does not confer final verification, the facility will have to cease operating the engine and abatement device.**

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

<b>Source:</b>	<b>PM<sub>10</sub> Emission Factor (g/HP-hr)</b>	<b>HP</b>	<b>Annual Usage (Hours/year)<sup>1</sup></b>	<b>Diesel Exhaust Particulate Emissions (lb/year):</b>	<b>Trigger Level (lb/yr)</b>	<b>Risk Screen Required? (Yes/No)</b>
<b>1</b>	<b>0.02</b>	<b>198</b>	<b>50</b>	<b>0.43</b>	<b>0.58</b>	<b>No</b>

Since the particulate emissions are below the trigger level, a risk screen is not required.

## **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 PM10 (<0.15 g/hp-hr), it is expected to comply with Reg. 6. 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 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.

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.

**Section (e)(4)(G)(2) requires a backpressure monitor for all diesel particulate filters (DPF) that are installed to comply with Section (e)(2). Since this engine emits less than 0.15 gr PM/hp-hr and the applicant has not requested more than 50 hours of operation for testing, the DPF is not required and Section (e)(4)(G)(2) does not require a backpressure monitor. However, since the risk assessment was based on the abated particulate emissions and the backpressure monitor is necessary to ensure proper operation, the monitor will be required. The basis for the condition will be "BAAQMD Regulation 2, Rule 5."**

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 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: NO<sub>x</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.

POLLUTANT	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice 3. TBACT	TYPICAL TECHNOLOGY
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>2</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
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>

The NO<sub>x</sub> and CO 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 <sub>x</sub>	4.32	6.9	YES
CO	0.89	2.75	YES

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

**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.

**NSPS:** The engine is subject to 40 CFR 60, Subpart III, 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 8.8 liters. Each cylinder has a volume of less than 10 liters. The engine is a 2007 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 above 300 and 600 hp, these standards are:

- NO<sub>x</sub> and HC: 3.0 g/hp-hr
- CO: 2.6 g/hp-hr
- PM: 0.15 g/hp-hr
- 20% opacity during acceleration
- 15% opacity during lugging
- 50% opacity during peaks in acceleration or lugging

According to CARB Executive Order U-R-002-0393, the engine will comply with these 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. This requirement will be in the permit conditions.

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. This requirement will be in the permit conditions.

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. This requirement will be in the permit conditions.

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(b)(1) because it has been 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 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.

**Section 60.4209(b) requires a backpressure monitor if a diesel particulate filter is necessary to comply with the emission limits in the NSPS. The engine will have a filter,**

but since the engine will meet the standard without the filter, this section does not apply. Since this engine emits less than 0.15 gr PM/hp-hr, the filter is not required and Section 60.4209(b) does not require a backpressure monitor. However, since the risk assessment was based on the abated particulate emissions and the backpressure monitor is necessary to ensure proper operation, the monitor will be required. The basis for the condition will be "BAAQMD Regulation 2, Rule 5."

The owner/operator is required to comply with certain sections of 40 CFR 60, Subpart A, General Provisions. These are listed in the part 5 of the permit conditions.

**NESHAP:** This engine is 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 15990: City of San Jose: Plant 15990:  
Conditions for S-1

#### **PC22850**

- 1. Operating for reliability-related activities is limited to 50 hours per year per engine.**  
[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)]

### PC23395

1. The owner/operator must operate and maintain the engine as required by the manufacturer's written instructions over the entire life of the engine. The owner/operator may only change those settings that are permitted by the manufacturer.

[Basis: 40 CFR 60.4206, 60.4211(a)]

2. The owner/operator must keep records of engine manufacturer data indication compliance with the emission standards in 40 CFR 60.4204(a)

[Basis: 40 CFR 60.4211(b)((3))]

3. Beginning October 1, 2007, the owner/operator shall use diesel fuel that conforms to the following per-gallon standards:

- a. Sulfur content: 500 parts per million (ppm) maximum.
- b. Cetane index or aromatic content, as follows:
  - i. A minimum cetane index of 40; or
  - ii. A maximum aromatic content of 35 volume percent.

[Basis: 40 CFR 60.4207(a), 40 CFR 80.510(a)]

4. Beginning October 1, 2010, the owner/operator shall use diesel fuel that conforms to the following per-gallon standards:

- a. Sulfur content: 15 ppm maximum for NR diesel fuel.
- b. Cetane index or aromatic content, as follows:
  - (ii) A minimum cetane index of 40; or
  - (i) A maximum aromatic content of 35 volume percent.

[Basis: 40 CFR 60.4207(b), 40 CFR 80.510(b)]

5. The owner/operator shall comply with the following sections of 40 CFR 60, Subpart A, General Provisions: 60.1-60.10, 60.12, 60.14-60.17, 60.19.

[Basis: 40 CFR 60, Subpart III, Table 8]

#### PC 23615

1. As of June 2007, the verification for A1, Cleaire Horizon Electric Particulate Filter is valid through January 26, 2010. If California Air Resources Board does not renew the verification, S1, Cummins Stationary Standby Generator and A1, Cleaire Horizon Electric Particulate Filter, shall shut down on January 26, 2010. [CARB Letter of 1/26/07, Reference No. RAS-07-02, BAAQMD Regulation 2, Rule 5]
2. To ensure compliance with the CARB Letter of 1/26/07, Reference No. RAS-07-02, the owner/operator shall ensure that the engine and filter complies with the following conditions:
  - a. The engine does not employ exhaust gas recirculation

- b. The engine does not have a pre-existing diesel oxidation catalyst or particulate filter from the original equipment manufacturer.**
- c. The engine is well maintained.**
- d. The engine does not consume lubricating oil at a rate greater than that specified by the equipment manufacturer.**
- e. Oil is not mixed with the fuel.**
- f. The filter is not used with any other systems or engine modifications with approval from CARB and the engine manufacturer.**

**[CARB Letter of 1/26/07, Reference No. RAS-07-02, BAAQMD Regulation 2, Rule 5]**

- 3. The owner/operator shall install, operate, and properly maintain a backpressure monitor that notifies the owner/operator when the high backpressure limit of the engine is approached.**

**[Basis: BAAQMD Regulation 2, Rule 5]**

**RECOMMENDATION**

Issue an Authority to Construct to City of San Jose for:

**S-1 Stationary Standby Generator Set: Diesel Engine; Make: Cummins; Model: QSL9-G2 NR3; Model Year 2007; Rated Horsepower: 198 HP; Abated by Cleaire Horizon Diesel Catalyzed Particulate Filter**

**EXEMPTIONS**

None.

By: \_\_\_\_\_ Date: 6/4/07  
Sheryl Wallace  
Air Quality Permit Technician