

**Engineering Evaluation Report
2558 Mission, LLC
Application #26654; Plant # 22709**

1. BACKGROUND

The application is for a Permit to Operate a 464 Bhp diesel engine used as a driver for an emergency generator. The source description is as follows.

S-1: Emergency Generator Diesel Engine 464 BHP Cummins Model QSL9-G7, EPA Engine Family ECEXL0540AAB.

The source is located within 1000 feet of the following three schools. Thus a public notification is required.

Buena Vista/Horace Mann
3351 23rd Street
San Francisco, CA 94110

Golden Bridges School
3358 22nd Street
San Francisco, CA 94110

Chavez (Ceasar) Elementary School
825 Shotwell Street
San Francisco, CA 94110

2. EMISSION CALCULATIONS

A. Calculations Basis:

Hours of Operation, Annual: 50 (For maintenance and testing)
 Engine Horsepower: 464
 Fuel Usage Rate: 21 gallons per hour
 Heating value 137,000 Btu/gallon
 Density 7.01 lb/gallon
 Sulfur Content (weight %) 0.0015%

Table 1, Emission Factors & Emissions

Table 1 presents emission factors from EPA Exhaust Emission Compliance Statement for Stationary Emergency Diesel Generator Set that was done in accordance with EPA 40 CFR Part 89 Subpart D and ISO 8178 for measuring NMHC,CO, PM and NO_x. These factors are used to calculate the criteria pollutant emissions.

Table 1: S-1 Criteria Pollutant Emissions

EMISSION CALCULATIONS					
Operating Hours Per Year (hr/yr)		50			
From Manufacturer's Data					
Fuel Consumption Rate (gal/hr)		21	Calc MMBTU/hr =	2.88E+00	
Brake Horsepower of Engine (HP)		464			
From CARB/EPA Certified Data					
Pollutant	Emission Factor (g/kw-hr)	Emission Factor (g/hp-hr)	Annual Emissions (lb/yr)	Annual Emissions (TPY)	Max. Daily (lb/day)
NOx		2.47	126.2	0.063	60.6
CO		1.7	86.9	0.043	41.7
POC		0.13	6.6	0.003	3.2
PM10		0.070	3.6	0.002	1.7
SO2		0.004	0.2	0.000	0.0

** SO₂ emission factor calculated based on 0.0015 weight % Sulfur in the fuel

*** Pound per day maximum is based on 24 hour continuous operation in case of a major power outage.

B. Cumulative Increase

Table 2 summarizes the cumulative increase in criteria pollutant emissions that will result from the operation of S-1 for 50 hours annually for testing and maintenance.

Table 2: S-1 Cumulative Increases in Criteria Pollutant Emissions

Cumulative Emission (t/y)	Existing	Current Emissions	Plant Total
Plant			
NOx	0	0.063	0.063
CO	0	0.043	0.043
POC	0	0.003	0.003
PM10	0	0.002	0.002
SO2	0	0.000	0.000

3. COMPLIANCE STATEMENT

TOXIC RISK SCREENING ANALYSIS

This application required a Toxics Risk Screen because diesel particulate emissions are greater than the toxic trigger level as shown in Table 3.

Table 3: Risk Screening Trigger for PM

Toxic Pollutant	Emission Rate (lb/yr)	Risk Screening Trigger (lb/yr)
Diesel Particulate	3.6 (50 h/y operation)	0.34

Further the following three schools are located within 1000 feet of source S-1. Thus a public notification is required.

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S-1 meets Best Available Control Technology for toxics (TBACT) since the diesel particulate emissions are less than 0.15 g/Bhp-hr. For an engine that meets the TBACT requirement, it must also pass the toxic risk screening level of less than ten in a million. Estimates of residential risk assume exposure to annual average toxic air contaminant concentrations occur 24 hours per day, 350 days per year, for a 70-year lifetime. Risk estimates for offsite workers assume exposure occurs 8 hours per day, 245 days per year, for 40 years. Risk estimates for students assume a higher breathing rate, and exposure is assumed to occur 10 hours per day, 36 weeks per year, for 9 years.

Based on 50 hours per year of operation, the emergency generator passed the Health Risk Screening Analysis (HRSA) conducted by the District. The source poses no significant toxic risk, since the increased cancer risk to the maximally exposed receptor (resident) is 0.87 chances in a million with a hazard index of 0.00031. The increased cancer risk to workers is 0.42 chances in a

million with a hazard index of 0.0003. Further the risk to the Buena Vista students is 0.12 chances in a million and the hazard index is 0.000094. Risk to the students at the Golden Bridges School is 0.15 chances in a million and the hazard index is 0.00012. In accordance with the District's Regulation 2, Rule 5, this risk level is considered acceptable, as it has been determined that S-1 meets the current TBACT standards. Thus the risk screen passes for 50 hours operation per year.

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 day of POC, NPOC, NO_x, CO, SO₂ or PM₁₀.

For this application BACT is triggered for NO_x and CO since the maximum daily emission of this pollutant exceeds 10 lb/day. BACT is presented in the current BAAQMD BACT/TBACT Workbook for IC Engine – Compression Ignition: Stationary Emergency, non-Agricultural, non-direct drive fire pump, Document # 96.1.3, Revision 7 dated 12/22/2010. Table 4 presents the BACT guidance for compression Ignition IC engines. S-1 Diesel engine complies with all the listed BACT requirements.

Table 4: BACT/TBACT Handbook Guidance for IC Engine

Source:	<i>IC Engine – Compression Ignition: Stationary Emergency, non-Agricultural, non-direct drive fire pump</i>	Revision:	7
		Document #:	96.1.3
Class:	> 50 Bhp Output	Date:	12/22/2010
POLLUTANT	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice 3. TBACT	TYPICAL TECHNOLOGY	
POC	1. n/s ^c 2. CARB ATCM standard ^a for POC at applicable horsepower rating (see attached Table).	1. n/s ^c 2. Any engine certified or verified to achieve the applicable standard. ^a	
NO _x	1. n/s ^c 2. CARB ATCM standard ^a for NO _x at applicable horsepower rating (see attached Table).	1. n/s ^c 2. Any engine certified or verified to achieve the applicable standard. ^a	
SO ₂	1. n/s ^c 2. Fuel sulfur content not to exceed 0.0015% (wt) or 15 ppm (wt).	1. n/s ^c 2. CARB Diesel Fuel (Ultra Low Sulfur Diesel)	
CO	1. n/s ^c 2. CARB ATCM standard ^a for CO at applicable horsepower rating (see attached Table).	1. n/s ^c 2. Any engine certified or verified to achieve the applicable standard. ^a	
PM ₁₀	1. n/s ^c 2. 0.15 g/Bhp-hr 3. 0.15 g/Bhp-hr	1. n/s ^c 2. Any engine or technology demonstrated, certified or verified to achieve the applicable standard. 3. Any engine or technology demonstrated, certified or verified to achieve the applicable standard.	
NPOC	1. n/s ^c 2. n/s ^c	1. n/s ^c 2. n/s ^c	

Reference:

- 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.*

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 per Regulation 2-2-302. Table 2 above summarizes increases in criteria pollutant emissions resulting from the operation of source S-1. Offsets are not triggered.

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 8.9 liters and 6 cylinders. Each cylinder has a volume of less than 10 liters per cylinder. The engine S-1 is a 2014 model year engine and is not a fire pump. Section 60.4205(b) requires the engine to comply with the emission standards cited in Section 60.4202, which refers to 40CFR89.112 and 40CFR89.113 for all pollutants. For engines greater than 300 Bhp and less than 600 Bhp these standards are:

NMHC+NO_x: 3 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

According to emissions factor calculated from the Exhaust Emission Data Sheet, the engine will comply with the 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. 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 a 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 more stringent 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 a 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 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 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/operators do not have to submit an initial notification to EPA for emergency engines.

Because the engine does not have a diesel particulate filter, the owner/operator is 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. The owner/operator is expected to comply with this requirement.

NESHAP

This engine is not subject to the emission or operating limitations in 40 CFR 63, Subpart ZZZZ, National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines, because source S-1 is an emergency stationary reciprocating internal combustion engines (40 CFR 63.6600(c)).

CARB STATIONARY DIESEL ENGINE ATCM

The State Office of Administrative Law approved the Airborne Toxic Control Measure (ATCM) on November 8, 2004. State law requires the local Air Districts to implement and enforce the requirements of the ATCM. Effective May 19th, 2011, there is a prohibition on the operation of new diesel emergency standby engines greater than 50 Bhp unless the following operating requirements and emission standards are met. :

“Stationary Diesel Engine ATCM” section 93115.6 (3)(A), title 17, CA Code of Regulations.

1. New stationary emergency standby diesel-fueled engines (>50 Bhp) shall:
 - a) meet the applicable emission standards for all pollutants for the same model year and maximum horsepower rating as specified in the following Table 5 Emission Standards for New Stationary Emergency Standby Diesel-Fueled CI Engines, in effect on the date of acquisition or submittal.

Table 5: Emission Standards for New Stationary Emergency Standby Diesel-Fueled CI Engines

Maximum Engine Power	Model Year	PM g/Bhp-hr (g/kW-hr)	NMHC+NO _x g/Bhp-hr (g/kW-hr)	CO g/Bhp-hr (g/kW-hr)
50 ≤ HP < 75 (37 ≤ kW < 56)	2007	0.15 (0.20)	5.6 (7.5)	3.7 (5.0)
	2008+			
75 ≤ HP < 100 (56 ≤ kW < 75)	2007	0.15 (0.20)	5.6 (7.5)	3.7 (5.0)
	2008+			
100 ≤ HP < 175 (75 ≤ kW < 130)	2007	0.15 (0.20)	3.0 (4.0)	3.7 (5.0)
	2008+			
175 ≤ HP < 300 (130 ≤ kW < 225)	2007	0.15 (0.20)	3.0 (4.0)	2.6 (3.5)
	2008+			
300 ≤ HP < 600	2007	0.15 (0.20)	3.0 (4.0)	2.6 (3.5)

(225 ≤ kW < 450)	2008+			
600 ≤ HP < 750	2007	0.15 (0.20)	3.0 (4.0)	2.6 (3.5)
(450 ≤ kW < 560)	2008+			
HP > 750	2007	0.15 (0.20)	4.8 (6.4)	2.6 (3.5)
(kW > 560)	2008+			

Table 6 demonstrates that Source S-1 meets these requirements

Table 6: ATCM Compliance

Pollutant	S-1 Emission Factors (g/Bhp-hr)	ATCM Requirement (g/Bhp-hr)
NMHC+NO _x	2.6	3.0
CO	1.7	2.6
PM ₁₀	0.07	0.15

- b) After December 31, 2008, be certified to the new non-road compression-ignition (CI) engine emission standards for all pollutants for 2007 and later model year engines as specified in 40 CFR, PART 60, Subpart III-Standards of Performance for Stationary Compression Ignition Internal Combustion Engines(2006); and
- c) Not operate more than 50 hours per year for maintenance and testing purposes.

This emergency standby diesel engine (S-1) is in compliance with the above ATCM requirements. The diesel engine will operate for no more than 50 hours per year for maintenance and reliability testing. This engine is subject to the Current off-road CI engine standards for PM₁₀, NMHC+NO_x and CO

2. The District may allow a new stationary emergency standby diesel-fueled CI engine (> 50 hp) to operate up to 100 hours per year for maintenance and testing purposes on a site-specific basis, provided the diesel PM emission rate is less than or equal to 0.01 g/Bhp-hr.

CEQA

This project is considered to be ministerial under the District's CEQA Regulation 2-1-311, Permit Handbook Chapter 3.1. 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.

District Regulations

Source S-1 complies with the following District Regulations:

Permits – General Requirements, Regulation 2 Rule 1

Source S-1 is located at less than 1,000 feet from The following two school and therefore the source is subject to the public notification requirements of Regulation 2-1-412.

Buena Vista/Horace Mann
3351 23rd Street
San Francisco, CA 94110

Golden Bridges School
3358 22nd Street
San Francisco, CA 94110

Chavez (Ceasar) Elementary School
825 Shotwell Street
San Francisco, CA 94110

A public notice will be distributed in accordance with the Regulation and the public comments will be addressed.

Regulation 9 Rule 8: Nitrogen Oxides and Carbon Monoxide from Stationary Internal Combustion Engines.

Source S-1 is exempt from the requirements of Sections 9-8-301, 302, 303, 304 and 305 in accordance with Regulation 9-8-111.3 since it operates less than 100 hours in any consecutive 12-month period.

Regulation 9-8-530: Emergency Standby and Low Usage Engines, Monitoring and Recordkeeping:

Source S-1 is expected to comply with this Regulation requiring a non-resettable totalizing meter that measures hours of operation or fuel usage, and record keeping requirements by imposing the condition.

Regulation 9-1-301: Limitation of Ground Level Concentration of SO₂:

Source S-1 is expected to comply with this regulation since 0.0015% ultra-low sulfur diesel will be used.

Regulation 6-301: Particulate and Visible Emissions

Source S-1 is expected to comply with Regulation 6-1-301 Ringelman limitation, 6-1-305 visible particulate limitation and 6-1-310 of 0.15 grains/dscf limitation, since source S-1 is a 2013 model engine and the particulate emission is 0.07 g/Bhp-hr which is less than the BACT threshold of 0.15 g/Bhp-hr.

4 CONDITION

**2558 Mission , LLC
Application #26654; Plant # 22709
Condition #22850**

The conditions apply to the following source:

S-1 Emergency Generator Diesel Engine 464 BHP Cummins Model QSL9-G7, EPA Engine Family ECEXL0540AAB.

1. The owner/operator shall not exceed 50 hours per year per engine for reliability-related testing. [Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary IC Engines]
2. The owner/operator shall operate the emergency standby engine only for the following purpose: 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: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]
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: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]
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: Title 17, California Code of Regulations, section 93115, ATCM for Stationary IC Engines]

- 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, athletic field, or other areas of school property but does not include unimproved school property

[Basis: Title 17, California Code of Regulations, section 93115, ATCM]

5. CONCLUSION AND 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 two schools, which trigger 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.

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 Emergency Generator Diesel Engine 464 BHP Cummins Model QSL9-G7, EPA Engine Family ECEXL0540AAB.

6. EXEMPTIONS

None

By: _____

Date:

Hari S Doss, PE
Air Quality Engineer