

DRAFT
ENGINEERING EVALUATION REPORT
NOB HILL MASONIC CENTER
PLANT NUMBER 18383
APPLICATION NUMBER 15928

BACKGROUND

Nob Hill Masonic Center (NOBHILL) has applied to obtain an Authority to Construct and a Permit to Operate the following equipment:

**S-1 Emergency Standby Diesel Engine-Generator Set, John Deere;
Model: 6068HF485; Rated Horsepower: 315 HP**

The generator-set will be sited at 1111 California Street, San Francisco, CA 94108.

The generator set will provide emergency power (in the event of a blackout) for all essential electricity power at the facility. This emergency engine-generator set must be periodically tested to ensure that it will generate power when needed.

EMISSIONS

Annual Emissions:

For emergency standby diesel engines, emissions are calculated based on reliability-related operation at 100% load using emission factors approved by CARB. For this application, the applicant has requested 50 hours per year for reliability-related operation. The CARB Certified emission factors for S-1 (315 HP- diesel engine, U-R-004-0280) are listed in Table 1 below:

Table (1)

Component	Emission (g/kW-hr)
NO _x + POC	3.4
CO	0.6
PM ₁₀	0.11
SO ₂	0.247

**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.*

SO₂ 8.09E-3 (% S in fuel oil) lb/hp-hr = 8.09E-3 (0.05% S) (454 g/lb) = 0.184 g/hp-hr

In accordance with District policy, 95% and 5% of the combined emission factor of NO_x + POC are assumed to be NO_x and POC, respectively. Hence, the NO_x and POC emission factors are 3.23 and 0.17 g/kW-hr, respectively.

Component		g/kW-hr	hp	kW/hp	hr/yr	lb/g		lb/yr		TPY
NOx	=	3.230	315	0.7457	50	0.0022046	=	83.63	=	0.042
CO	=	0.600	315	0.7457	50	0.0022046	=	15.54	=	0.008
POC	=	0.170	315	0.7457	50	0.0022046	=	4.40	=	0.002
PM10	=	0.110	315	0.7457	50	0.0022046	=	2.85	=	0.001
SO2	=	0.247	315	0.7457	50	0.0022046	=	6.40	=	0.003

Maximum Daily Emissions:

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

POLLUTANT		g/kW-hr	hp	kW/hp	hr/day	lb/g		lb/day
NOx	=	3.230	315	0.7457	24	0.0022046	=	40
CO	=	0.600	315	0.7457	24	0.0022046	=	7
POC	=	0.170	315	0.7457	24	0.0022046	=	2
PM10	=	0.110	315	0.7457	24	0.0022046	=	1
SO2	=	0.247	315	0.7457	24	0.0022046	=	3

Plant Cumulative Increase: (tons/year)

POLLUTANT	Existing	New	Total
NOx	0	0.042	0.042
CO	0	0.008	0.008
POC	0	0.002	0.002
PM10	0	0.001	0.001
SO2	0	0.003	0.003

Toxic Risk Screening:

The toxic emission of diesel particulate does exceed the District Risk Screening Trigger, as shown in Table (2) below. A Risk Screening Analysis has been performed.

Table (2)

Source	PM ₁₀ Emission Factor (g/bHP-hr)	HP	Annual Usage (Hours/year)	Diesel Exhaust Particulate Emissions (lb/year)	Trigger Level (lb/yr)	Risk Screen Required? (Yes/No)
1	0.082	315	50	2.85	0.58	YES

Since the engine meets Best Available Control Technology for Toxics (TBACT) requirements (emission level of 0.15 g/hp-hr or less), the maximum acceptable cancer risk is 10 in a million. Results from the health risk screening analysis show that for 50 hours of operation per year, excluding periods when operation is required due to emergency conditions, the risks to the maximally exposed nearest worker receptor and

resident receptor are 0.79 in a million and 1.83 in a million, respectively. The analysis was performed at a PM₁₀ emission of 2.85 lb/year. In accordance with the District's Regulation 2, Rule 5, this risk level is considered acceptable.

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 potential exposure to annual average TAC concentrations occur 24 hours per day, 350 days per year, for a 70-year lifetime. Risk estimate for an offsite worker assumes potential exposure occurs 8 hours per day, 245 day per year, for 40 years. Since the engine is not allowed to operate for reliability-related purposes between 7:30 a.m. and 3:30 p.m. on days when the school is in session, potential exposure to students is considered negligible. (Note that this operating restriction is from the Stationary Diesel Engine Air Toxics Control Measure discussed below.)

The CARB staff has determined that the John Deere engine model listed above is in compliance with the PM emission requirements of less than or equal to 0.15g/bhp-hr from the California Code of Regulations Title 17, Section 93115 (e)(2)(A) 3., Table 1: Summary of the Emission Standards and Operating Requirements for New Stationary Emergency Standby Diesel-Fueled CI Engines > 50 BHP. Therefore, the above John Deere engine model qualifies for use in California for standby generator set applications operating at 50 hours per year for maintenance and testing.

STATEMENT OF COMPLIANCE

S-1 will be operated as an emergency standby engine and therefore is not subject to the emission rate limits in Regulation 9, Rule 8 ("NO_x and CO from Stationary Internal Combustion Engines"). S-1 is subject to the monitoring and record keeping requirements of Regulation 9-8-530 and the SO₂ limitations of 9-1-301 (ground-level concentration) and 9-1-304 (0.5% by weight in fuel). Regulation 9-8-530 requirements are incorporated into the proposed permit conditions. Compliance with Regulation 9-1 is expected since diesel fuel with a 0.05% by weight sulfur is mandated for use in California. Like all sources, S-1 is subject to Regulation 6 ("Particulate and Visible Emissions"). This engine is not expected to produce visible emissions or fallout in violation of this regulation and they will be assumed to be in compliance with Regulation 6 pending a regular inspection.

This diesel engine is subject to the Stationary Diesel Engine Air 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 are included in standard permit condition 22850 (for an emergency standby diesel engine located within 500 feet of a school and allowed 50 hours of operation per year for testing and maintenance).

This application is considered to be ministerial under the District's proposed CEQA guidelines (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 emission factors in accordance with Permit Handbook Chapter 2.3.1.

The project is within 1000 feet of a K-12 school, Cathedral School for Boys, and is therefore subject to the public notification requirements of Reg. 2-1-412. A public notice was distributed on **To be determined** to the parents and guardians of the school identified above and all addresses within 1000 feet of the source. The comment period ended **To be determined** and **To be determined** comments were received. The comments and District responses are summarized below:

To be determined

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 is subject to BACT for the following pollutants: 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 the BACT 2 limits presented below.

POLLUTANT	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice 3. TBACT	TYPICAL TECHNOLOGY
NO _x	1. 1.5 g/bhp-hr [107 ppmvd @ 15% O ₂] <i>a,b</i> 2. 6.9 g/bhp-hr [490 ppmvd @ 15% O ₂] <i>a,b,c</i> 3. 6.9 g/bhp-hr [490 ppmvd @ 15% O ₂] <i>a,b,c</i> 2	1. Selective Catalytic Reduction (SCR) + Timing Retard + Turbocharger w/ Intercooler <i>a,b</i> 2. Timing Retard ≤ 4° + Turbocharger w/ Intercooler <i>a,b,c</i> 3. Timing Retard ≤ 4° + Turbocharger w/ Intercooler

For NO_x, the emission limit set by BACT 2 is met, as shown in Table (3) below.

Table (3)

Pollutant	Engine Emission Factor (g/kW-hr)	Engine Emission Factor (g/hp-hr)	Emission Factor Limits as set by BACT 2 (g/hp-hr)	Have the limits been met?
NO _x	3.23	2.41	6.9	YES

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

Since CARB certification data was used to establish the NO_x emission factors, the BACT 2 emission limits have not been incorporated into the permit conditions and are assumed to be complied with 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_x. Based on the emission calculations above, offsets are not required for this application.

PSD, NSPS, and NESHAPS do not apply.

PERMIT CONDITIONS

Application 15928;
Plant 18383; Nob Hill Masonic Center

Conditions for S-1 Emergency Standby Diesel Engine-Generator Set: Make: John Deere; Model: 6068HF485; Rated Horsepower: 315 HP

Permit Condition Number 22850

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)]
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)]
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 60 months from the date of entry. 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).

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[Basis: "Stationary Diesel Engine ATCM" section 93115,
title 17, CA Code of Regulations, subsection
(e)(4)(I);Regulation 1-441]

5. 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 since the engine is located within 500 feet of school grounds.

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

RECOMMENDATION

Issue an Authority to Construct to Nob Hill Masonic Center for the following source:

- S-1 Emergency Standby Diesel Engine-Generator Set: Make: John Deere;
Model: 6068HF485; Rated Horsepower: 315 HP**

By: _____
Dharam Singh, PE
Air Quality Engineer

Date: 8/23/07