DRAFT

ENGINEERING EVALUATION
City of Fremont, Fire Station #2
Plant: 19504
Application: 19836

37299 Niles Blvd.
Fremont, CA 94536

BACKGROUND

City of Fremont has applied to obtain an Authority to Construct (AC) and/or a Permit to Operate (PO) for the following equipment:

S-1 Emergency Standby Diesel Generator Set, Generac generator model: SD080 powered by 2009 John Deere engine, Model: 4045HF285H, 126 BHP, 0.86 MMBTU/hr

EMISSIONS

Basis:
126 hp output rating
50 hr/yr operation for testing and maintenance
6.3 gallons/hr max fuel use rate
NMHC + NOx, CO and PM10 emission factors were provided by manufacturer's emissions data
SO2 emissions are quantified based on the full conversion of 0.0015 wt% (~ 15 ppm) sulfur in the ULS diesel fuel. The SO2 emission factor was derived from EPA AP-42, Table 3.4-1.

Annual Emissions:
Annual emissions are calculated based on the number of hours per year of operation for testing and maintenance.

Daily Emissions:
Daily emissions are calculated to establish whether a source triggers the requirement for BACT (10 lb/highest day total source emissions for any class of pollutants). 24-hr/day of operation will be assumed since no daily limits are imposed on intermittent and unexpected operations.

Table 1

Pollutant	Emission Factor (g/kw-hr)	Emission Factor (g/hp-hr)	Annual Emissions (lb/yr)	Annual Emissions (TPY)	Max. Daily (lb/day)
NMHC+NOx	3.80	2.83			
NOx	3.70	2.76	38.30	0.0192	18.39
POC	0.10	0.07	1.04	0.0005	0.50
CO	2.2	1.64	22.77	0.0114	10.93
PM10	0.206	0.154	2.13	0.0011	1.02
SO2		0.001515 *lb SO2/MMBTU	0.07	0.00003	0.03

PLANT CUMULATIVE INCREASE

Table 2 summarizes the cumulative increase in criteria pollutant emissions that will result from the operation of S-1.

Table 2

Pollutant	Current Emissions (since April 5, 1991) (TPY)	Increase with this application (TPY)	Cumulative Emissions (Current + Increase) (TPY)
NOx	0.000	0.019	0.019
POC	0.000	0.001	0.001
CO	0.000	0.011	0.011
PM10	0.000	0.001	0.001
SO2	0.000	0.000	0.000

TOXIC RISK SCREENING ANALYSIS

This application required a Toxics Risk Screen because the diesel particulate emissions are greater than the toxic trigger level.

Toxic Pollutant Emitted	Emission Rate (lb/yr)	Risk Screening Trigger (lb/yr)
PM10 (Diesel Particulate)	2.13	0.58

S-1 meets Best Available Control Technology for toxics (TBACT). 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 contaminate 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 (HRA) conducted on March 4, 2009 by the District's Toxic Evaluation Section. The source poses no significant toxic risk, since the increased cancer risk to the maximally exposed receptor (resident) is 3.6 in a million with a hazard index for of 2.2E-3. The increased cancer risk to workers is 3.0 in a million with a hazard index of 2.1E-3. The increased cancer risk to students is 0.0077 in a million with a hazard index of 1.9E-5. In accordance with the District's Regulation 2, Rule 5, this risk level is considered acceptable, as it has been determined that the engine meets the current TBACT standards.

BACT

BACT is triggered for NOx and CO since the maximum daily emissions of these pollutants exceeds 10 lb/day. Please refer to the discussion on "Daily Emissions" in page 1 of this evaluation. BACT for this source is presented in the current BAAQMD BACT/TBACT Workbook for this source category as shown below:

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Best Available Control Technology (BACT) Guideline

Source Category

Source:	***IC Engine - Compression Ignition***	Revision:	***5***
		Document #:	***96.1.1***
Class:	***< 175 horsepower output rating***	Date:	***01/11/02***

Determination

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_2] [a,b]* 2. *1.5 g/bhp-hr [309 ppmvd @ 15% O_2] [b,c]*	1. *Catalytic Oxidation and/or CARB or EPA (or equivalent) low-total hydrocarbon emitting certified engine [a,b]* 2. *CARB or EPA (or equivalent) low-total hydrocarbon emitting certified engine [b,c]*
NOx	1. *1.5 g/bhp-hr [107 ppmvd @ 15% O_2] [a,b]* 2. *6.9 g/bhp-hr [490 ppmvd @ 15% O_2] [a,b,c]* 3. *6.9 g/bhp-hr [490 ppmvd @ 15 % O_2] d*	1. *Selective Catalytic Reduction (SCR) + Timing Retard + Turbocharger w/ Intercooler [a,b]* 2. *Timing Retard $\leq 4^o$ + Turbocharger w/ Intercooler [a,b,c]* 3. *Timing Retard $\leq 4^o$ + Turbocharger w/Intercooler*
SO_2	1. *n/d* 2. *If practical, gas-fueled engine or electric motor. If not, "California Diesel Fuel"(fuel oil < 0.05% by weight sulfur) [a,b]*	1. *n/d* 2. *Fuel Selection [a,b]*
CO	1. *n/s* 2. *2.75 g/bhp-hr [319 ppmvd @ 15% O2] [b,c]*	1. *Catalytic Oxidation[b]* 2. *CARB or EPA (or equivalent) low-CO emitting certified engine [b,c]*
PM_{10}	1. *n/d* 2. *If practical, gas-fueled engine or electric motor. If not, "California Diesel Fuel" (fuel oil w/ < 0.05% by weight sulfur and < 20% by volume aromatic hydrocarbons) [b]* 3. *0.1 grams/bhp-hr*	1. *Catalyst Guard Bed [a,b]* 2. *Fuel Selection [b]* 3. *CARB or EPA (or equivalent) low-particulate matter emitting certified engine, or particulate filter*
NPOC	1. *n/a* 2. *n/a*	1. *n/a* 2. *n/a*

References

a. CARB/CAPCOA Clearinghouse
b. BAAQMD, NOTE: IC Engine BACT and TBACT is a low emitting, spark-ignited, gas-fueled engine with lean burn combustion or rich burn with non-selective catalytic reduction, or electric motor. A diesel engine will be permitted only if a gas-fueled engine, or electric motor, is not practical (e.g., a remote location without natural gas availability or electric power, or only a diesel engine will meet the portability and/or power/torque/rpm requirements of the application under review, or the engine is used exclusively for emergency use during involuntary loss of power).
c. Timing retard, etc. controls alone may be acceptable only in very limited situations for temporary sources.

It can be seen from above that S-1 satisfies the current BACT 2 standard for NOx (6.9 g/bhp-hr) and CO (2.75 g/bhp-hr). The more restrictive BACT 1 standard is not applicable to this engine because it will be limited to operation as an emergency standby engine.

OFFSETS

Table 3 summarizes the increase in criteria pollutant emissions that will result from the operation of S-1.

Table 3

Pollutant	Current plant emissions (TPY)	Increase in plant emissions associated with this application (TPY)	Cumulative emissions (Current + Increase) (TPY)	Regulation 2-2-302 and 2-2-303 Offset Triggers (TPY)
NOx	0.000	0.019	0.019	> 10; < 35
POC	0.000	0.001	0.001	> 10; < 35
CO	0.000	0.011	0.011	NA
PM10	0.000	0.001	0.001	> 1*
SO2	0.000	0.000	0.000	> 1*

*Applies to major facilities with a cumulative increase, minus contemporaneous emission reduction credits, in excess of 1 ton/year since April 5, 1991.

It can be seen from Table 3 above that S-1 does not trigger any offset. Therefore, offsets are not warranted for any emission.

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 4.5 liters and has 4 cylinders, so each cylinder has a volume of less than 10 liters. The engine is a 2009 model year engine and is not a fire pump. Section 60.4205(b) requires these engines to comply with the emission standards in Section 60.4202, which refers to 40CFR89.112 and 40CFR89.113 for all pollutants. For engines greater than or equal to 100 hp and less than 175 hp, these standards are:

NMHC+NOx: 3.0 g/hp-hr
CO: 3.7 g/hp-hr
PM: 0.22 g/hp-hr
20% opacity during acceleration mode
15% opacity during lugging mode
50% opacity during peaks in acceleration or lugging mode

According to manufacturer's emissions data, 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 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 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 engine does not have a diesel particulate filter, it 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 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.

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 January 1, 2005, 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, title 17, CA Code of Regulations.

Diesel PM – General Requirements

1. Meet 0.15 g/bhp-hr PM standard
2. Operate 50 hours per year, or less, for maintenance and testing (except emergency use and emissions testing)

HC,NOx, NMHC+NOx, CO

1. Meet standards for off-road engines of the same model year and horsepower rating as specified in the OFF-Road Compression Ignition Engine Standards;
   or if no standards have been established
2. Meet the Tier 1 standards for an off-road engine for the same maximum rated power.

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 Tier 3 off-road CI engine standards for HC, NOx, NMHC+NOx and CO. As shown in the Table 4, the engine meets these requirements.

Table 4. ATCM Tier 3 Compliance

	CARB Certified g/bhp-hr	ATCM Tier 3 g/bhp-hr
NMHC+NOx	2.8	3.0
NOx	N/A	N/A
NMHC (POC)	N/A	N/A
CO	1.6	3.7
PM	0.15	0.15

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 ("NOx 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, Rule 1 is very likely since diesel fuel with a 0.0015% by weight sulfur is mandated for use in California. Like all combustion 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 will be assumed to be in compliance with Regulation 6 pending a regular inspection.

This application is considered to be ministerial under the District's 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.

This facility is less than 1,000 feet from the nearest school and therefore is subject to the public notification requirements of Regulation 2-1-412. A public notice was prepared and sent to:

All addresses within 1000 feet of the diesel generator set.
Parents and guardians of students of Niles Elementary School, 37141 2nd St., Fremont, CA 94536

PSD is not triggered.

PERMIT CONDITIONS

CONDITION 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) 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)]

RECOMMENDATION

Issue an Authority to Construct to City of Fremont for:

S-1 Emergency Standby Diesel Generator Set, Generac generator model: SD080 powered by 2009 John Deere engine, Model: 4045HF285H, 126 BHP, 0.86 MMBTU/hr

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Kathleen Truesdell
Air Quality Engineer II
Engineering Division
Date: 2/25/09