DRAFT
Engineering Evaluation
Folger Building LLC,
Plant Number: 19410, and Application Number: 19260
Evaluated by: Olabode Thomas Ajibola

Background

Folger Building LLC has applied to obtain an Authority to Construct (AC) and/or a Permit to Operate (PO) for the following new equipment:

S-1
Emergency Standby Diesel Generator at **101 Howard Street**
2008 John Deere, Model: 4024HF285B **San Francisco, CA 94105**
79 BHP, 149 cu in

Because this is a diesel generator set, chapter 2.3 of the permit handbook is applicable. BACT is triggered, and BACT2 is applicable because the source will operate primarily during emergencies.

Recommendation

Issue Authority to Construct for above equipment.

EMISSIONS

Annual Average Emissions:

Basis:
- 79 bhp output rating, 50 hr/yr operation for testing and maintenance
- NMHC + NOx, PM10, and CO emission factors provided by CARB Certification with Executive Order U-R-004-0331
- The NMHC emission rate is assumed to be equal to 5% of the NMHC + NOx emission factor certified by CARB
- Heat capacity of diesel is 137,000 BTU/gal
- SO2 emissions are quantified based on the full conversion of 0.0015 wt% (~ 15 ppm) sulfur in the ULS diesel fuel with a density of 7.206 lbs/gal that is consumed at a rate of 4.16 gallons/hr.

Pollutant	Engine Emissions g/kw-hr	Engine Emissions g/bhp-hr
NMHC (POC)	0.100	0.075
NOx	4.580	3.417
NMHC+NOx	4.680	3.491
CO	1.170	0.873
PM	0.160	0.119

Pollutant	hours/yr		BHP		emission factor g/bhp-hr		lb=454 grams		lb/year		TPY
NOx	50	x	79	x	3.41668	/	454	=	29.73	=	0.014863
CO	50	x	79	x	0.87282	/	454	=	7.59	=	0.003797
POC	50	x	79	x	0.0746	/	454	=	0.65	=	0.000325
PM10	50	x	79	x	0.11936	/	454	=	1.04	=	0.000519

	Sulfur content		fuel density (lb/gal)		Max fuel use		(lb SO2/ lb S)		hr/yr		lb/yr		TPY
SO2	0.000015	x	7.206	x	4.16	x	2	x	50	=	0.044965	=	2.25E-05

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.

Pollutant	hours/yr		BHP		emission factor g/bhp-hr		lb=454 grams		lb/day
NOx	24	x	79	x	3.41668	/	454	=	14.27
CO	24	x	79	x	0.87282	/	454	=	3.65
POC	24	x	79	x	0.0746	/	454	=	0.31
PM10	24	x	79	x	0.11936	/	454	=	0.50

	Sulfur content		fuel density (lb/gal)		Max fuel use		(lb SO2/ lb S)		hr/day		lb/day
SO2	0.000015	x	7.206	x	4.16	x	2	x	24	=	0.021583

Plant Cumulative Increase
Folger Building LLC is a new facility. Therefore, the District's database contains no information on existing emissions at the plant. Table 1 summarizes the cumulative increase in criteria pollutant emissions that will result at Plant 19410 from the operation of S-1.

Table 1

Pollutant	Current plant emissions (TPY)	Increase in plant emissions associated with this application (TPY)	Cumulative emissions (Current + Increase)
NOx	0	0.0149	0.0149
CO	0	0.0038	0.0038
POC	0	0.0003	0.0003
PM10	0	0.0005	0.0005
SO2	0	0.0000	0.0000

Toxic Risk Screening Analysis
The cancer risk is calculated based on the emission rate of diesel exhaust particulate matter. Diesel exhaust particulate matter is used as a surrogate for all toxic contaminants found in diesel exhaust. Because the proposed emissions (1.04 lb/yr) exceed the risk screening trigger level for diesel exhaust particulate matter in Table 2-5-1 (0.58 lb/yr), a risk screening will be performed.

BACT

BACT is triggered for NOx since the maximum daily emissions of the above pollutant exceed 10 lb/day. Please refer to the discussion on "Daily Emissions" in page 2 of this evaluation. BACT for this source is presented in the current BAAQMD BACT/TBACT Workbook for this source category as shown below:

Source Category

Source:	***IC Engine - Compression Ignition***	Revision:	***5***
		Document #:	***96.1.2***
Class:	***> or = 175 horsepower output rating***	Date:	***01/11/02***

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

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). The more restrictive BACT 1 standard is not applicable to this generator set because it will be limited to operation as an emergency standby engine.

Offsets

Folger Building LLC is a new facility. Table 2 summarizes the increase in criteria pollutant emissions that will result at Plant 19410 from the operation of S-1.

Table 2

Pollutant	Total Annual Emissions TPY	Regulation 2-2-302 and 2-2-303 Offset Triggers (TPY)

NOx	0.0149	> 10; < 35
CO	0.0038	> 10; < 35
POC	0.0003	NA
PM10	0.0005	> 1
SO2	0.0000	> 1

It can be seen from Table 2 above that S-1 does not trigger any offset. Therefore, offsets are not warranted for any emission.

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 3 standards in Title 13, CCR, Section 2423 for off-road engines of the same horsepower rating, irrespective of the new engine's model year

This emergency standby diesel generating set (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 EPA Tier 3 requirements for HC, NOx, NMHC+NOx and CO. As shown in the Table3, the engines meet these requirements.

Table3. ATCM Tier 3 Compliance

	Engine Emissions g/bhp-hr	ATCM Tier 1 g/bhp-hr
NMHC (POC)	0.075	1.0
NOx	3.417	N/A
NMHC+NOx	3.491	3.5
CO	0.873	3.7
PM	0.119	0.3

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.

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)

This facility is over 1,000 feet from the nearest school and therefore is not subject to the public notification requirements of Regulation 2-1-412.

NSPS

The engine is not subject to 40 CFR 60, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines because it was not manufactured after April 1, 2006, as required by Section 60.4200(a)(2)(I).

The engine has a total displacement of 2.4 liters and has 4 cylinders, so each cylinder has a volume of less than 10 liters. The engine is a 2008 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 engine between 50 and 100 hp, these standards are:

NOx + NMHC: 3.5 g/hp-hr
CO: 3.7 g/hp-hr
PM: 0.3 g/hp-hr
20% opacity during acceleration mode
15% opacity during lugging mode
50% opacity during peaks in acceleration or lugging mode

According to CARB Executive Order U-R-004-0331, the engine will comply with the standards.

Sections 60.4206 and 60.4211(a) require that the owner/operator operates 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.

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 maximum sulfur content of 500 parts per million (ppm), a cetane index of 40 or a maximum aromatic content of 35 percent by volume. 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 maximum sulfur content of 15 parts per million (ppm), and the same cetane index or aromatic content as previously stated. California Air Resources Board (CARB) diesel fuel, which has a maximum sulfur content of 15 ppm and a maximum aromatic content of 10 to 20 percent by volume, is the only diesel fuel available in California. Staff in the Stationary Source Division of CARB indicate that some verified diesel fuel in California may have a maximum aromatic content greater than 10 percent if the fuel has been demonstrated to have an equal or greater emissions benefit as diesel fuel with maximum aromatic content of 10 percent, but no verified fuel has had an aromatic content greater than 25 percent.

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(b) 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 60.4209(b) (installation of a backpressure monitor) or 60.4214(c) (records of corrective action taken after high backpressure).

The owner/operator is required to comply with certain sections of 40 CFR 60, Subpart A, General Provisions. These are listed in the permit conditions. [Subpart IIII, Table 8]

PSD and NESHAPS are not triggered.

PERMIT CONDITIONS

Condition No. 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)(B)(3) or Regulation 2-5]

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 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 Folger Building LLC an Authority to Construct for the following equipment:

S-1
Emergency Standby Diesel Generator at **101 Howard Street**
2008 John Deere, Model: 4024HF285B **San Francisco, CA 94105**
79 BHP, 149 cu in

Olabode Thomas Ajibola
Air Quality Engineering Intern
Engineering Division
Date: 4/26/10