

ENGINEERING EVALUATION (DRAFT)
Verizon Wireless (DT Livermore) Plant: 19786
Application: 20853
Date: 09/22/09

BACKGROUND

Verizon Wireless (DT Livermore) has applied to obtain an Authority to Construct (AC) and/or a Permit to Operate (PO) for the following equipment, S-1:

S-1
Emergency Standby Diesel Generator at **1000B Lambeth Rd**
John Deere, Model: 4024HF285B **Livermore, CA 94551**
80 BHP, 2.4L

Recommendation: Issue Verizon Wireless (DT Livermore) an AC and/or PO

EMISSIONS

Annual Average Emissions:

- Basis:
- 80 bhp output rating
 - 50 hr/yr operation for testing and maintenance
 - NMHC, NOx, PM10 emission factors provided by Manufacturer based on 5-mode testing, submitted to CARB
 - CO emission factors provided by CARB Certification with Executive Order U-R-004-0347
 - 4.01 gal/hour Fuel Consumption based on “Table 1: Standby Diesel Engine Parameters”

NMHC + NOx: 3.06 g/bhp-hr
 NMHC (~ POC): 0.15 g/bhp-hr
 NOx: 2.91 g/bhp-hr
 CO: 1.27 g/bhp-hr
 PM₁₀: 0.16 g/bhp-hr

Pollutant	hr/yr		BHP		Emission factor (g/bhp-hr)	1 lb = 454 g		lbs/yr		TPY	
NO _x	50	*	80	*	2.91	/	454	=	25.60	=	0.0128
CO	50	*	80	*	1.27	/	454	=	11.17	=	0.0056
POC	50	*	80	*	0.15	/	454	=	1.35	=	0.0007
PM ₁₀	50	*	80	*	0.12	/	454	=	1.05	=	0.005

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 4.01 gal/hr.

	Sulfur Content		Fuel density (lb/gal)		Max fuel use (gal/hr)		64 lb SO ₂ = 32 lb S		hr/yr		lb/yr		TPY
SO ₂ *	0.000015	*	7.206	*	4.01	*	2	*	50	=	0.0433	=	0.000022

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	Item(s)	Max hr/day	BHP	Emission factor (g/bhp-hr)	1 lb = 454 g	lbs/day
NO _x	1 *	24	* 80	* 2.91 /	454 =	12.29
CO	1 *	24	* 80	* 1.27 /	454 =	5.36
POC	1 *	24	* 80	* 0.15 /	454 =	0.65
PM ₁₀	1 *	24	* 80	* 0.12 /	454 =	0.51

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 4.01 gal/hr.

Sulfur Content	Fuel density (lb/gal)	Max fuel use (gal/hr)	64 lb SO ₂ = 32 lb S	hr/day	lb/day
SO ₂ *	0.000015 *	7.206	* 4.01	* 2	* 24 = 0.0208

PLANT CUMULATIVE INCREASE

The District does not have any records of Verizon Wireless (DT Livermore) as it is a new facility. Therefore, the District’s database does not contain information on existing emissions at the plant. Table 1 summarizes the cumulative increase in criteria pollutant emissions that will result at Plant 19786 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) (TPY)
NO _x	0	0.01280	0.01280
CO	0	0.00559	0.00559
POC	0	0.00067	0.00067
PM ₁₀	0	0.0005	0.0005
SO ₂	0	0.00002	0.00002

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 exceed the risk screening trigger level for diesel exhaust particulate matter in Table 2-5-1 (0.58 lb/yr), a risk screening was performed.

Per the attached November, 17th 2009 memo from Catherine Fortney, results from the health risk screening analysis indicate that the maximum cancer risk is estimated at 0.54 in a million if the

engine were to run for 50 hours/year. In accordance with the District’s Regulation 2, Rule 5, the above risk level is considered acceptable for an engine such as S-1 that meets TBACT.

BACT

BACT is triggered for NOx since the maximum daily emissions of the above pollutant exceeds 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:	<i>IC Engine – Compression Ignition: Stationary Emergency, non-Agricultural, non-direct drive fire pump</i>	Revision:	6
		Document #:	96.1.3
Class:	> 50 BHP Output	Date:	04/13/2009
POLLUTANT	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice 3. TBACT	TYPICAL TECHNOLOGY	
NOx	1. n/s ^d 2. Current tier ^{a,b} standard for NOx at applicable horsepower rating.	1. n/s ^d 2. Any engine certified or verified to achieve the applicable standard. ^{a,b}	

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 at 3.325 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

Verizon Wireless (DT Livermore) is a new facility. Therefore, the District has no record of the of emission equipment. Table 2 summarizes the increase in criteria pollutant emissions that will result at Plant 19786 from the operation of S-1.

Table 2

Pollutant	Increase in emissions at plant since April 5, 1991 (TPY)	Increase in emissions associated with this application (TPY)	Total emissions (Post 4/5/91 + Increase) (TPY)	Regulation 2-2-302 and 2-2-303 Offset Triggers (TPY)
NO _x	0	0.01280	0.01280	> 10; < 35
CO	0	0.00559	0.00559	NA
POC	0	0.00067	0.00067	> 10; < 35
PM ₁₀	0	0.00069	0.0005	> 1
SO ₂	0	0.00002	0.00002	> 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,NO_x, NMHC+NO_x, 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 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 EPA Tier 3 requirements for HC, NO_x, NMHC+NO_x and CO. As shown in the Table3, the engines meet these requirements.

Table3. ATCM Tier 3 Compliance

Pollutant	CARB (g/hp-hr)	ATCM Tier 3 Limits (g/hp-hr)
NMHC + NO _x	3.06	3.50
CO	1.27	3.70
PM	0.12	0.30

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 9 liters and has 6 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 between 75 hp and 100 hp, these standards are:

NMHC+NOx: 3.5 g/hp-hr

CO: 3.7 g/hp-hr

PM: 0.30 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-004-0347, 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.

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. 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.

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)]
1. 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, playground, athletic field, or other areas of school property but does not include unimproved school property. [Basis: "Stationary Diesel Engine" section 93115, title 17, CA Code of Regulations, subsection(e)(2)(A)(1)] or (e)(2)(B)(2)]

End of Conditions

RECOMMENDATION

Issue Verizon Wireless (DT Livermore) an AC and/or PO for the following equipment:

S-1

Emergency Standby Diesel Generator at 1000B Lambeth Rd
John Deere, Model: 4024HF285B Livermore, CA 94551
80 BHP, 0.55 MMBTU/hr

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Air Quality Engineering Intern