

ENGINEERING EVALUATION
P#21859-A#25292
VERIZON WIRELESS-DALY CITY
2171 JUNIPERO SERRA BLVD
DALY CITY, CA 94014

Background:

Verizon Wireless Daly City has applied for an Authority to Construct and/or Permit to Operate the following equipment.

- S-1: Emergency Standby Natural Gas Engine Generator Set: Natural Gas Engine Make: Generac; Model: SG070; Rated Horsepower: 107 HP; Year Model: 2012; Firing Rate: 1.005 MMBtu/hr.
- A-1 Abated by: 3-Way Catalyst; Make: Generac Power Systems.

The generator set is located at 2171 Junipero Serra Blvd, in Daly City, California.

The natural gas powered emergency standby generator set (S-1) will provide emergency standby power in the event of a disruption to power service. The engine is equipped with a Non-Selective Catalytic Converter to reduce exhaust emissions of nitrogen oxides (NO_x), precursor organic compound (POC) and carbon monoxide (CO).

Emission Summary:

The Emergency Standby Engine will operate during emergency use and for a maximum of 50 hours per year for maintenance and testing. For this report, it is assumed that the emission value of total unburned hydrocarbons (HC) is equivalent to the emission value of Precursor Organic Compound (POC). The total reductions in emissions after abatement from the standby engine are as shown below in Table 1.

Table 1

Emission Factors			
Component	Emissions Without Abatement (g/bhp·hr)	Emissions With Abatement (g/bhp·hr)	Reduction In Wt. %
NO _x	0.04	0.004	90
CO	0.49	0.049	90
POC	0.20	0.02	90
PM ₁₀	negligible	negligible	negligible

**The emission factor for SO₂ is from Chapter-3, Table 3.2-2 of the EPA Document AP-42, Emission Factors for 4-Stroke Rich-Burn Engines. SO₂: 5.88E-4 lb/MMBtu.*

Maximum emissions in tons per year:

Table 3 (With Abatement)

Maximum Emissions in Tons per year								
Pollutant		g/hp-hr	hp	hr/yr	lb/grams		lb/yr	TPY
NO _x	=	0.004	107	50	0.0022	=	0.0471	= 2.35E-5
CO	=	0.049	107	50	0.0022	=	0.5767	= 2.88E-4
POC	=	0.02	107	50	0.0022	=	0.2354	= 1.18E-4
PM ₁₀	=	neg.	107	50	0.0022	=	neg.	= neg.

$$\text{SO}_2 = (5.88\text{E-}4 \text{ lb/MMBtu}) * (1.005 \text{ MMBtu/hr}) * (50 \text{ hrs. /yr}) = 0.03 \text{ lb/yr}$$

$$= 1.5\text{E-}5 \text{ tpy}$$

Maximum Daily Emissions:

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

Table 4

Maximum Daily Emissions (With Abatement)						
Pollutant		g/hp-hr	hp	hr/day	lb/g	lb/day
NO _x	=	0.004	107	24	0.0022	= 0.0226
CO	=	0.049	107	24	0.0022	= 0.2768
POC	=	0.02	107	24	0.0022	= 0.113
PM ₁₀	=	neg.	107	24	0.0022	= neg.

$$\text{SO}_2 = (5.88\text{E-}4 \text{ lb/MMBtu}) * (1.005 \text{ MMBtu/hr}) * (24 \text{ hrs/day})$$

$$= 0.0142 \text{ lb/day}$$

$$\text{SO}_2 = 0.0006 \text{ lb/hr} * 50 \text{ hr/yr}$$

$$\text{SO}_2 = 0.03 \text{ lb/yr} / 2000 \text{ lb/ton}$$

$$\text{SO}_2 = 1.5\text{E-}5 \text{ tpy}$$

Plant Cumulative Increase: (tons/year):

Table 5

Plant Cumulative Increase			
Pollutant	Existing tons/yr	New tons/yr S-1	Total tons/yr
NO _x	0.00	2.35E-5	2.35E-5
CO	0.00	2.88E-4	2.88E-4
POC	0.00	1.18E-4	1.18E-4
PM ₁₀	neg.	neg.	neg.
SO ₂	0.00	1.5E-5	1.5E-5

Toxic Emissions:

The emission factors used to estimate Hazardous Air Pollutants (HAPs) emissions from the engine described above are from AP-42 for natural gas fired 10-cylinder rich burn engine Table 3.2-3, and from California Air Toxics Emission Factor Database (maintained by the California Air Resources Board) for natural gas fired 4-Stroke Rich Burn Engines with less than 650 hp.

The engine being permitted has a maximum firing rate of 1.005 MMBtu/hr and a maximum rating of 107 hp. The HAP emission estimates are based on uncontrolled emission factors for natural gas engines and an assumed abatement efficiency of 90% removal of organic HAP compounds. The abatement efficiency is based on the fact that the engine is being permitted with Non-Selective Catalytic Reduction (NSCR).

Since there is an abatement device associated with this application, a 90% reduction in organic compounds will be assumed.

As shown in Table 6, 7, and 8 below, no toxic air contaminants exceed the District Risk Screening Triggers and a Risk Screening Analysis is not required.

Table 6 (HAP Emissions Estimates BASED On AP-42 Table 3.2-3)

Compounds	E.F. lb/MMBtu	Abated Emissions (lb/hr)	Acute Trigger Level (lb/hr)	HRSA Triggered ? (Y/N)	Abated Emissions (lb/yr)	Chronic Trigger Level (lb/yr)	HRSA Triggered ? (Y/N)
1,1,2,2-Tetrachloroethane	2.53E-05	2.54E-06	None	NO	1.27E-04	1.90E+00	NO
1,1,2-Trichloroethane	1.53E-05	1.54E-06	None	NO	7.69E-05	6.60E+00	NO
1,1-Dichloroethane	1.13E-05	1.14E-06	None	NO	5.68E-05	6.60E+01	NO
1,2-Dichloroethane	1.13E-05	1.14E-06	None	NO	5.68E-05	5.30E+00	NO
Carbon Tetrachloride	1.77E-05	1.78E-06	4.2E+00	NO	8.89E-05	2.50E+00	NO
Chlorobenzene	1.29E-05	1.30E-06	None	NO	6.48E-05	3.90E+04	NO
Chloroform	1.37E-05	1.38E-06	3.3E-01	NO	6.88E-05	2.00E+01	NO
Ethylene Dibromide	2.13E-05	2.14E-06	None	NO	1.07E-04	1.50E+00	NO
Methanol	3.06E-03	3.07E-04	6.2E+01	NO	1.54E-02	1.50E+05	NO
Methylene Chloride	4.12E-05	4.14E-06	3.1E+01	NO	2.07E-04	1.10E+02	NO
Styrene	1.19E-05	1.20E-06	4.6E+01	NO	5.98E-05	3.50E+04	NO
Vinyl Chloride	7.18E-06	7.21E-07	4.0E+02	NO	3.61E-05	1.40E+00	NO

Note: Abatement Efficiency = 90%.

Fuel Used = 1.005 MMBtu/hr.

Hours of Operation = 50 hr/yr.

Table 7 (CATEF Emission Factors for Rich Burn, 4 Stroke, Natural Gas Engines, < 650 HP)
Acute and Chronic Emissions:

	E.F. MEAN	Abated Emissions	Acute Trigger Level	HRSA Triggered?	Abated Emissions	Chronic Trigger Level	HRSA Triggered?
SUBSTANCE	lbs/MMBtu	(lb/hr)	(lb/hr)	(Y/N)	(lb/yr)	(lb/yr)	(Y/N)
1,3-Butadiene	1.02E-04	1.02E-05	None	NO	5.12E-04	6.30E-01	NO
Acetaldehyde	8.66E-04	8.70E-05	1.00E+00	NO	4.35E-03	3.80E+01	NO
Acrolein	5.14E-03	5.16E-04	5.50E-03	NO	2.58E-02	1.40E+01	NO
Benzene	7.25E-05	7.28E-05	2.90E+00	NO	3.64E-03	3.80E+00	NO
Ethylbenzene	1.14E-05	1.15E-06	None	NO	5.73E-05	4.30E+01	NO
Formaldehyde	4.89E-05	4.91E-05	1.2E-01	NO	2.46E-03	1.80E+01	NO
Naphthalene	7.50E-05	7.54E-06	None	NO	3.77E-04	3.20E+00	NO
Propylene	1.52E-02	1.53E-03	None	NO	7.64E-02	1.20E+05	NO
Toluene	1.05E-03	1.05E-04	8.2E+01	NO	5.27E-03	1.20E+04	NO
Xylene	5.90E-05	5.93E-06	4.9E+01	NO	2.96E-04	2.70E+04	NO
PAH Equivalents as Benzo(a)pyrene	2.08E-07	2.09E-08	None	NO	1.04E-06	6.90E-03	NO

Note: Abatement Efficiency = 90%.

Fuel Used = 1.005 MMBtu/hr.

Hours of Operation = 50 hr/yr.

Table 9 CATEF: For PAHs-benzo(a) pyrene equivalent

	CATEF		OE-HHA	Benzo(a)
	Emission	Emission	Potency	Pyrene
	Factor	Factor	Equivalency	Equivalent
Pollutant Name	(lb/MMBtu)	Source	Factors	
Benzo(a)anthracene	2.88E-07	CATEF	0.1	2.88E-08
Benzo(b)fluoranthene	2.32E-07	CATEF	0.1	2.32E-08
Benzo(k)fluoranthene	1.01E-07	CATEF	0.1	1.01E-08
Benzo(a)pyrene	1.13E-07	CATEF	1	1.13E-07
Chrysene	3.04E-07	CATEF	0.01	3.04E-09
Dibenz(a,h)anthracene	1.23E-08	CATEF	1.05	1.29E-08
Indeno(1,2,3-cd)pyrene	1.66E-07	CATEF	0.1	1.66E-08
			Total	2.08E-07

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 not subject to BACT

Statement of Compliance:

Regulation 6, Rule 1:

Since the engine is fueled with natural gas, the owner/operator is expected to comply with Regulation 6 (Particulate Matter General Requirements). Thus for any period aggregating more than three minutes in any hour, there should be no visible emission as dark or darker than No.2 on the Ringelmann Chart (Regulation 6-1-303).

Regulation 9, Rule 1:

The owner/operator of S-1, 107 hp Generac Emergency Standby Natural Gas Engine Generator Set, abated by A-1 Non-selective catalytic reduction system will comply with Reg. 9-1-301 (Inorganic Gaseous Pollutants: Sulfur Dioxide for Limitations on Ground Level Concentrations). From Regulation 9-1-301, the ground level concentrations of SO₂ will not exceed 0.5 ppm continuously for 3 consecutive minutes or 0.25 ppm averaged over 60 consecutive minutes, or 0.05 ppm averaged over 24 hours due to the low sulfur content of utility grade natural gas

Regulation 9, Rule 8, Section 330 and 530:

The allowable operating hours and the corresponding records keeping in Regulation 9-8-330 (*Emergency Standby Engines, Hours of Operation*) and 530 (*Emergency Standby Engines, Monitoring and Recordkeeping*) will be included in the Permit Conditions below.

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 2.3.2)

The project is within 1000 feet from the Jefferson High school and therefore subject to the public notification requirements of Reg. 2-1-412.

Offsets:

Offsets must be provided for any new or modified source at a facility that emits more than 10 tons/yr of POC or NOx. Based on the emission calculations above, offsets are not required for this application.

PSD does not apply.

NSPS:

This engine is subject to 40 CFR part 60, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines, because the owner/operator commenced operation after June 12, 2006 and the engine has a maximum engine power less than 500 hp per Section 60.4230(a)(4)(iii).

Section 60.4233(e) requires compliance with the emission standard in Table 1 to the above subpart for the emergency stationary SI IC Engines.

Table 1 to Subpart JJJJ Part 60:

HC + NOx	10 g/hp-hr
CO	387 g/hp-hr

Section 60.4243 states that the owner/operator must comply by purchasing an engine that is certified to meet the standard and by operating and maintaining the engine according to the manufacturer's instructions. In this case, the owner/operator is not subject to performance testing. The engine meets the standards as purchased. A condition requiring operation and maintenance in accordance to the manufacturer's instructions will be included in the permit conditions.

In addition, the owner/operator must comply with the sections of 40 CFR 1068, subparts A through D that apply. Generally, for owner/operators, this standard prohibits tampering with the emission controls.

NESHAPS:

40 CFR, Part 63, Subpart ZZZZ NESHAP for reciprocating internal combustion engines (RICE): Section 63.6590 (c) (1) requires only compliance with NSPS Subpart JJJJ for new engines.

PERMIT CONDITIONS

Condition #25617 for S-1 Emergency Standby Natural Gas Fired Engine Generator Set, Plant #21859:

1. The owner/operator shall operate the stationary emergency standby engine, only to mitigate emergency conditions or for reliability-related activities (maintenance and testing). Operating for reliability-related activities is limited to 50 hours per year. [Basis: Emergency Standby Engines, Hours of Operation Regulation 9-8-330]
2. The owner/operator shall ensure that the heat input rate does not exceed 10.05 therms/hr. [Basis: Regulation 2-1-403]
3. The Owner/Operator shall equip the emergency standby engine with: a non-resettable totalizing meter that measures hours of operation [Basis: Emergency Standby Engines, Monitoring and Record keeping 9-8-530]
5. The owner/operator shall operate and maintain the engines according to the manufacturer's emission-related written instructions. [Basis: 40 CFR 60.4243(a)(1)]
4. The owner/operator shall comply with any sections of 40 CFR 1068, General Compliance Provisions for Highway, Stationary, and Non-road Programs, subparts A through D, that apply. [Basis: 40 CFR 60.4243(a)(1)]
5. The Owner/Operator shall not operate unless the natural gas fired engine is abated with a Non-Selective Catalytic Reduction Unit [Basis: Cumulative Increase]
6. The Owner/Operator shall maintain the following monthly records in a District-approved log for at least 24 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 (maintenance and testing).
 - b. Hours of operation (emergency).
 - c. For each emergency, the nature of the emergency condition.
 - d. Fuel usage for engine.[Basis: Emergency Standby Engines, Monitoring and Recordkeeping 9-8-530]

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 a school, which triggers the public notification requirements of District regulation 2-1-412.6. After the comments are received and reviewed, the District will make a final determination on the permit.

I recommend that 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 Standby Natural Gas Engine Generator Set: Natural Gas Engine Make: Generac; Model: SG070; Rated Horsepower: 107 HP; Year Model: 2012; Firing Rate: 1.005 MMBtu/hr.

A-1 Abated by; 3-Way Catalyst; Make: Generac Power Systems.

By: Madhav Patil
Air Quality Engineer

Date: 09/9/2013